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INDIA RUBBER WORLD

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The Packaging of Smoked Sheets for Plantations Shipment

Don E. Andrews [1]

THIS paper was written at the suggestion of the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society for the purpose of encouraging improved packaging of crude rubber with especial respect to cleanliness of the product.

The transformation of latex, which constitutes the rubber crop, as harvested by our Eastern plantations, into a dry, hard solids form, is illogical and fundamentally wrong from the point of view of manufacturing many rubber articles of commerce. The plasticizing of this resultant dry rubber product necessitates the use of heavy machinery and expensive procedures, which, in many cases, could be replaced by lighter machinery and less expensive procedures if the rubber could be delivered as latex or in a more plastic state. However, since the practice in general still demands this dry rubber product, the transport of these rubber sheets free from moisture and free from foreign-material contamination is of very great importance and demands that adequate packing protection be provided for the journey from producer to consumer.

As regards No. 1 quality production, the producing estate in the Far East has the choice of one or both standard types of first latex market grades: namely, smoked sheets or pale crepes. In general in both instances meticulous care is taken as regards handling and cleanliness in the actual processing, drying, and packing of these relatively thin, but wide ribbons of rubber in their preparation and shipment on to the market.

Inherent differences between sheet and crepe rubbers—we are referring to No. 1 grades only—may permit of quite different styles of packaging, perfectly satisfactory so far as the individual rubbers are concerned.

Early Wood Cases

Originally the Far Eastern plantations adopted a wooden packing case into which, whether creped or smoked, the sheets were carefully folded and pressed. The outstandingly best wooden container and the one quite generally adopted from the earliest period was the Venesta, a triple plywood affair adapted from the tea industry. Subsequently various plywood chests following this Venesta led to the practical exclusion of Mumi cases and other wooden boxes which had been manufactured from locally available timbers. Complaints of splinters were heard from the rubber consumers almost from the beginning, since a high percentage of even the strongest and best wooden packages were damaged through ship-sling handling and stowage. Further, and particularly true with metal cornered riveted containers, the opening of the case at destination proved an operation where splintering of covers was inevitable, and further contamination in the form of wood splinters was added to the product. But this serious criticism of the wood container was partly solved shortly through the incorporation of various case linings and ultimately the adoption of wrapper sheets of rubber itself inside the cases.

Gunny Covered Bales

In 1914, having watched the operation of tobacco baling on Sumatra's East Coast, employes on the United States Rubber Co.'s plantations conceived the idea of packing H.A.P.M. sheets in the form of a bale with strap iron bands to guarantee minimum deformation. An old tobacco press was secured; bailing box and accessories were designed and constructed; and this initial effort, which proved fairly successful, really inaugurated the idea of bales with gunny jackets for the transport of rubber from Netherland India to U.S.A. factories.

In the application of a bale procedure to pale thin crepes it was found early in this development that several factors were involved which made such a rubber non-adaptable to baling. The extra pressure administered to the sheets of crepe had a darkening effect on the color and caused a massing of the rubber, which was undesirable. The objections, therefore, shortly led away from

[1] Plantation Division of the United States Rubber Co., New York, N. Y.

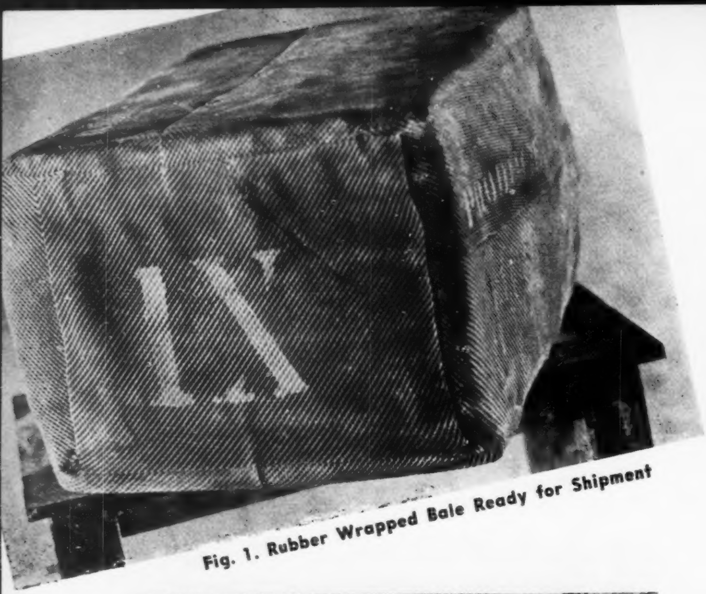


Fig. 1. Rubber Wrapped Bale Ready for Shipment

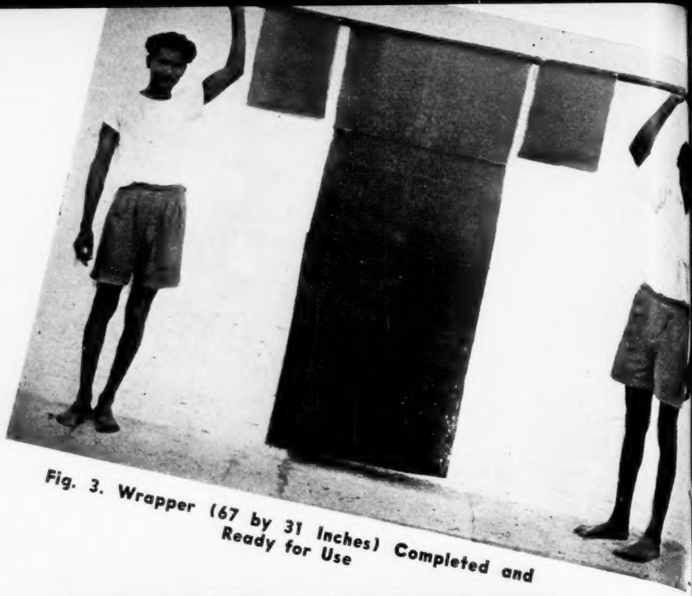


Fig. 3. Wrapper (67 by 31 Inches) Completed and Ready for Use

Fig. 2. Sheets on Baling Truck Ready to Be Put under Pressure

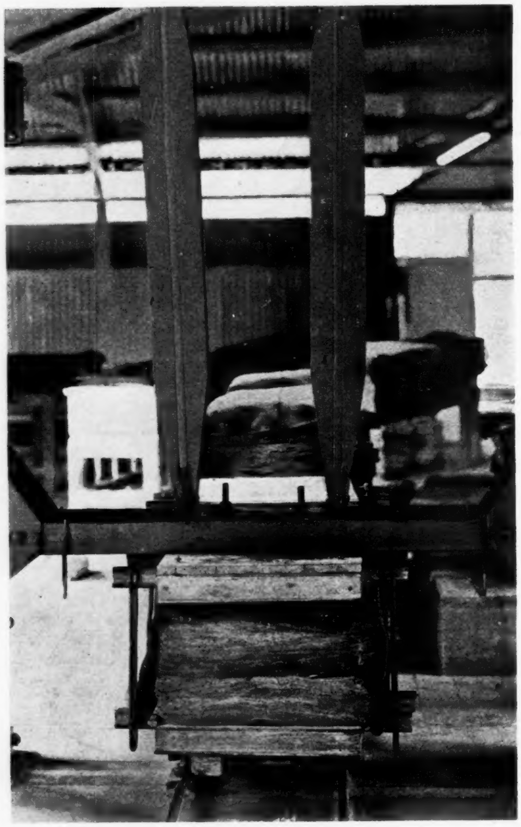


Fig. 4. Sheets Compressed in Bale Form

baling for No. 1 thin pales and to the use of bales for sheet rubbers and off-grade types of crepes only. This tendency carries on to this day.

In the baled sheet package Hessian cloth (gunny) was used exclusively for some time notwithstanding a marked fiber inclusion with the surface rubber, particularly objectionable where softer sheets were being transported. While wood splinters were thus being avoided, the consumer soon discovered an even more serious contamination and a serious problem in this fiber adherence to bales. Various efforts were made by both shippers and users to overcome this difficulty. Copious talc sifting was employed by packers on bale surfaces under the jackets, and a blow torch charring of protruding fiber was adopted by consumers when packing material was being removed. Unfortunately consumer straining of the crude rubber—quite extensively employed in the removal of foreign substances—would not answer this problem of fiber since the latter in single filaments passed quite readily through the screens. Substitutes for gunny cloth have also been tried—but with indifferent success. Experiments on bale shipments in large tonnages have been made with coverings of tobacco mats, grass mattings, and second-hand rice bags.

Studies were instituted both here and in the Far East for substituting some smooth faced material in place of gunny. Fabrics and papers of numerous types were tried including a latex treated tough Kraft product. Also various plied and strengthened papers were tested. In addition

a large number of straight-carton and plied-carton materials were investigated, and several carton box manufacturers designed and endeavored to have adopted both one way shippers and reshippable carton containers. It was hoped that some type of carton might prove a replacement not only for bale coverings, but for wooden cases. The reshippable cartons were planned for return to the Far East in collapsed form in bundles to minimize freight. Dozens of various ideas were developed, most of which were tested by U. S. Rubber in cooperation with the manufacturers in trial shipments of rubber under actual shipping conditions.

Rubber Covered Bales

In the meantime U. S. Rubber sheet rubbers were continuing to come forward in gunny wrapped bales, but with a specially treated glue-talc Hessian cloth, the treatment of which theoretically was to hold the fibers flat and keep them from adhering to the rubber. The continued criticisms against gunny coverings, however, did impel U. S. Rubber plantations to discontinue use of this material for its bales of special sprayed rubber. The L.S. type of rubber, however, made of spray-dried rubber particles hydraulically pressed produces a perfectly smooth homogenous bale with its faces automatically case-hardened by this pressure, thus resulting in a surface naturally repellent to any dirt adhesion. L.S., therefore, is in a class by itself, presenting quite a different bale problem from the so-called market grade rubbers. After various unsatisfactory trials with other types of coverings some five or six years ago, bales of sprayed rubber were finally forwarded as a test without any jacket whatever. The outturn was very satisfactory, and since that time this

Fig. 6. Rubber Wrapper before Joining into Bag Form

grade of rubber has been coming forward as naked bales, and the package has been favorably received by carriers as well as consumers.

Metal Banded Bales

The fact that L.S. bareback bales

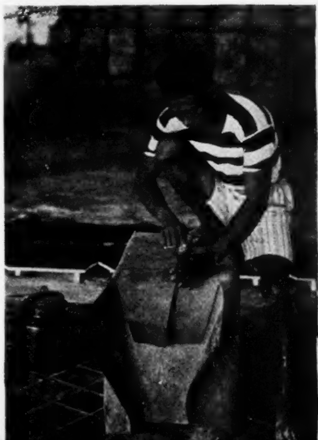


Fig. 7. Wrapper Being Folded and Cemented into Bag on Wooden Form

Fig. 5. Compressed Bale with Wrapper about to Be Adjusted

performed so satisfactorily, however, was undoubtedly an important factor in suggesting a bale of crude rubber to be covered with a protective jacket composed of the rubber itself. In its first inception and trial a main difficulty was found in obtaining a secure bonding of sheets making up the jacket. Also considerable study had to be devoted to the question of legible stenciling of shipping marks on the raw rubber surfaces. Volume shrinkage in the bale resulted in folds in the rubber covering, as a result of which cargo hook handling took its toll in perforated and torn jackets. The first of these rubber wrapped bales rather naturally involved the use of band iron in the early stages of development; the straps were tried out on the bale proper underneath the wraps and also on the outside of wrappers. This use of bands was objectionable to consumers because of the time and trouble involved in their removal and in the disposal of the iron scrap. Also quite often some pieces of strap iron, particularly with softer sheets, would be engulfed by the rubber surfaces and discovered only in cutting or break-down operations.

Unbanded Bales

As a result of the band iron troubles, the U. S. Rubber plantations determined to produce a satisfactory bale to be constructed without ties or reenforcements except for the containing rubber jacket. After a period of experimentation a bale, such as visualized above, was developed and has now been very successfully adapted to all sheet shipments from the Far East plantations of the United States Rubber Co.

In the transport of this bale a serious misunderstanding arose about a year ago which resulted in cargo classification of this rubber wrapped package with bales shipped by other estates, which were also being shipped without

Fig. 8. Placing the Assembled Rubber Bag over the Bale

Fig. 9. Final Sealing of the Bale

wood or gunny coverings. These latter packages, generally naked except for a strip of cloth around the center for grade marks, had given the carriers serious trouble in ship's stowage through adhesion of sheet ends to other bales and/or to other cargo. Demonstrations were immediately made, however, proving that, when properly handled and stowed, the United States Rubber Co. rubber wrapped bale offers no problems in the matter of transport. In the success of this package the cooperation of steamship lines was an important factor, and it was found that carriers were not only willing to assist, but were anxious for the experiment to turn out satisfactorily. These bales are now accepted readily by all transportation agencies and are being well received by plants which have properly evaluated the objectionable features incorporated in gunny or mat wrappings, which latter usually embrace iron strapping as well.

Fig. 10. Trough in Which Sheets Are Folded and Cut for Assembly into Bale Units

Fig. 11. Continuous Circular Track Pressing and Baling Unit

Procedure for Producing Rubber-Wrapped Bales

We offer herewith a description of how this new rubber wrapped bale is accomplished, a few Far Eastern photographs of actual operations, and certain details regarding the necessary original equipment and the procedures involved which have been found essential in the production of a successful rubber wrapped package.

A gross 250-pound standard weight has been adopted for the bale with a volume of 4.99 cubic feet per final package, i.e., 10.02 bales per ship's ton of 50 cubic feet. (Figure 1.) A rubber sheet of about $\frac{3}{16}$-inch gage and weighing approximately eight pounds per bale will produce a very satisfactory wrapper.

Pressing Equipment

A special electrically driven press is generally employed. However any type of press, hydraulic or knuckle-jointed hand press, is equally applicable so long as a sufficient opening between platens is obtainable. The electric press is preferred because of increased output capacity. (Figures 2 and 4.)

Rubber Wrapper

The jacket or covering, of proper size and shape, is built up prior to the baling operation from selected large sheets of uniform thickness of the same grade of rubber as the bale to be enclosed. Placement of the wrapper

under tension on the bale is accomplished by leaving a part of the jointing open until the wrapper is in final position. In the fastening of rubber sheets into this specially shaped wrapper form, a quick drying rubber cement is employed and the same adhesive used in the sealing of the final closing joint. In the actual baling operation two systems of handling of wrapper are employed.

On the Malayan estates the wrapper is assembled as one piece with the exception of the two end pieces (Figure 3) and placed in such a position on top of the loose rubber under the top platen as to prevent the folded wrap from becoming entangled in the pressing process. (Figures 2 and 4.) With final bale removal from the press the three sides together with the two free end wrapper pieces (Figure 5) are lapped and cemented into a one-piece jacket. The usual adhesive consists of one gallon of petrol, ten ounces of smoked sheet rubber, and ten ounces of resin.

On the Sumatra estates the entire wrapper is applied after the pressing operation is completed. This is accomplished by building a rubber bag form which is slipped over the finished pressed rubber in a manner identical to customary practice in adjusting gunny covers. Four photographs show this Sumatran detail: Figure 6 shows the pattern to which the rubber wrap is cut and made into a completed wrapper. In Figure 7 the cut wrapper is being shaped and cemented into a bag on a wooden bale form, the dimensions of the latter are one inch smaller than the finished bale. (Figures 6, 7, 8, and 9.) The bag is then slipped over the pressed bale. (Figure 8.) The flaps are folded and cemented into place so as to seal the bale as shown in Figure 9. The handling and the talcing of the bale itself are described below under baling procedure.

Preliminary Forming of Sheets

In order to obtain uniform shape and dimensions of the finished bale and particularly to speed up the actual baling operation, the long sorted sheets of rubber from the drying house are first carefully placed by hand (appropriately folded) into a wooden packing trough shown in Figure 10 (13 feet long, 18 inches wide and 10 inches deep). This trough is provided with cutting apertures at 22-inch intervals; thus after cutting, each loading trough produces seven preliminary blocks of sheet rubber 22 by 18 by 10 inches.

Baling Procedure

The sheet rubber for shipment, now in packing-trough form, is assembled by means of a platform scale to the standard weight of 250 pounds including the wrapper. From the scale the trough-blocks of rubber piled in perfect alinement go on to a baling truck where the pressure is administered. (See Figure 2.) These relatively loosely packed sheets, supported by the truck, under the travel of the upper press platen rapidly assume the correct finished bale size and dimensions and are there held under pressure for at least 30 minutes by means of the truck clamps shown in Figure 4. A steel reenforced plate, maintaining the pressure evenly on top of the bale, is held in position by these clamps. With the pressure administered to a standard bale thickness and the clamps made fast, the platen pressure is released, and the truck with its load is pushed from the press.

This truck operates on a circular track and, carrying a given bale, makes two trips through the press: first for the initial pressing, and second for pressure release prior to wrapping. This circular-track baling and pressing unit is shown in Figure 11. As this partially completed bale leaves the press, a second truck loaded, as described above, enters, and the pressing and the clamping are repeated. With an electric press installation a 15-truck track has been found most efficient.

This procedure at the press is continuous, for the length of the circular track and the number of trucks are such that after No. 1 bale has passed under the press for the second time (this time for release of clamps), a permanent set in the rubber has taken place to such an extent that its release from top-plate pressure merely establishes a bale of the desired dimension and volume. The sheet rubber container or wrapper is then finally adjusted; the final lap is sealed, and the package ready for stenciling and shipment. In the actual pressing operation, to facilitate the handling of the heavily reenforced holding-covers, only every other truck is loaded, thus alternating trucks on which the pressure is to be released with trucks newly loaded on which the pressure is to be administered. By this method, when a bale is released from pressure, the heavy top-plate is caught by a special attachment and held at the top of the press in proper position for its use over the bale on the following truck, which is to go under pressure and pass around the track circuit for its final release.

Generous talcing is administered not only to the naked bale, but to the inside of the wrapper, and after stenciling of the finished package a thorough talcing of the completed bale is carried out. This talcing is repeated, if necessary, dependent upon the number of handlings up to and into stores for steamer loading. Some of the carriers, appreciative of the advantages of this all-rubber package, make a practice of dusting all tiers of "rubber wraps" as they go into final ship stowage. As a matter of fact, ship stowage talcing should always be done to avoid any possibility of bale adhesion.

The above, in conjunction with accompanying photographs, gives a detailed outline of the manner in which U.S. Rubber estates now package their smoked sheet for shipment. It also gives an idea of the vast amount of study and trial which has been given the problem. It is our opinion that this rubber wrapped bale is the best commercially practicable package for smoked sheet rubber which has been devised to date. Both dealers and manufacturers are keenly interested in this type of package, and we believe that carriers also will find definite advantages in its use as soon as proper stowage and handling procedure have become established as a matter of routine.

Modified Polystyrene Resins

MODIFIED styrene polymers, known as Cyrene resins, recently were introduced by The Neville Co., Pittsburgh, Pa. Like the firm's paracoumarone-indene resins, the new resins are hard, thermoplastic, resistant to water, acids, and alkalis, and soluble in aromatic hydrocarbons.

Coumarone resins are brittle and non-elastic, have low solvent retention, but good adhesion. Cyrene resins, however, are tough and somewhat elastic, but do not have very good adhesion. Also in contrast to coumarone resins, Cyrene resins are not suitable for varnishes and are not compatible with drying oils; yet they do show a higher degree of cohesion than the coumarone resins.

Cyrene resins may be cut back (lowered in melting point) with Nevinol or Neville No. 2 refined heavy oil. These cut-backs are said to be distinctly elastic. Exceptional freedom from tackiness is also characteristic of all Cyrene resins. Their use is suggested in such fields as adhesives, plastic molding compounds, surface coatings where contact with petroleum oils is necessary, and where coumarone resins have been found too brittle.

Vulcanization of Rubber[1]—

Harry L. Fisher[2]

THE rubber chemist who has directed his efforts toward building a sound theory for the mechanism of vulcanization has met with only partial success. This century-old problem is still basically unsolved. The present article again attacks this problem, and after discussing the rudiments of sulphur and non-sulphur vulcanization, the author proposes a new theory on vulcanization, based on a study of non-sulphur vulcanization, which explains many of the facts of sulphur vulcanization. This provocative article should be studied by all those interested in the chemistry of rubber vulcanization.

The following abstract of the article eliminates the introductory part which deals with the history of Goodyear's discovery and the later advances as well as a review of the properties of vulcanized rubber. However, herein, is reproduced verbatim the author's basic and technical discussion of vulcanization. EDITOR'S NOTE.

The chemical changes involved in the process of vulcanization and their theoretical aspects will be discussed later in this paper. First, an outline of the methods used in vulcanization will be given, and the agents, other than sulphur, which bring about the same or similar changes described.

Sulphur Vulcanization

Vulcanization can be carried out by mixing 5 to 8 parts of sulphur into 100 parts of rubber and heating the mixture for three to four hours at about 141° C. Modern methods involve the use of organic accelerators which shorten the time of vulcanization and give valuable properties to the products not obtainable otherwise. With a small proportion of one of these very active types of accelerators, vulcanization is complete in as many minutes as it takes hours with sulphur alone and at lower temperatures. Using these very active or ultra-accelerators, rubber can be vulcanized even at room temperature. Much smaller proportions of sulphur are required in conjunction with accelerators, and these lower proportions give desirable properties.

As the proportion of sulphur is increased to 14-18 parts, the vulcanizates have lower tensile strength and generally are not of commercial importance; but as the proportion is increased to 30-50 parts, the products become hard, the elongation drops to a very low figure, and the tensile strength increases considerably. Thus hard rubber or ebonite is made.

Non-Sulphur Vulcanizing Agents

Under this heading all vulcanizing agents other than elemental sulphur will be considered.

Sulphur Monochloride. The first agent other than sulphur was discovered only a short time after Goodyear's discovery. Sulphur monochloride[3] vulcanizes rubber rapidly and at room temperature, but can be used only on thin sheets of rubber.

Selenium can also be used but only in combination with an organic accelerator.[4] Apparently it does not form a hard rubber. With sulphur it seems to act as an accelerator. Tellurium has little effect alone as a vulcanizing agent although it has some value in rubber compounding.

Ethyl Thiosulphite, $(C_2H_5O)_2S_2$, vulcanizes rubber at room temperature.[5]

Nitrogen Sulphide, N_4S_4, an unstable substance, vulcanizes rubber.[5]

Sulphur Dithiocyanate, $S(CNS)_2$, is claimed to give vulcanizates of greater durability than those obtained with sulphur monochloride.[6] A mixture of the di- with the monothiocyanate is used in carbon disulphide, since the dithiocyanate is not very soluble.

Tetraalkylthiuram Disulphides give very good vulcanizates, alone and in the presence of zinc oxide.[7] They are also powerful accelerators of sulphur vulcanization. During vulcanization tetramethylthiuram disulphide is reduced to the monosulphide which blooms out, and it is belived by some that the extra atom of sulphur is split off in an active form which is said to be the real vulcanizing agent.

$$(CH_3)_2N{-}\overset{\overset{\displaystyle S}{\|}}{C}{-}S{-}S{-}\overset{\overset{\displaystyle S}{\|}}{C}{-}N(CH_3)_2 \rightarrow$$

Tetramethylthiuram disulphide

$$(CH_3)_2N{-}\overset{\overset{\displaystyle S}{\|}}{C}{-}S{-}\overset{\overset{\displaystyle S}{\|}}{C}{-}N(CH_3)_2 + S$$

Tetramethylthiuram monosulphide

The monosulphide is a strong accelerator, but is not a vulcanizing agent, even in the presence of an oxidizing agent.

Polynitrobenzenes were the first strictly nonsulphur vulcanizing agents. They were discovered in 1915 by Ostromislensky[8] who chose them "because, as weak oxidizing agents, they possess, like sulphur, the ability to combine with certain unsaturated hydrocarbons; in addition, many physical properties of nitro compounds, especially their existence in the form of so-called crystal isomers (polymorphism), made them resemble sulphur even more closely," also "because oxygen as an element belongs to the sulphur group." Inorganic oxides, especially litharge, are necessary for the best action of the polynitrobenzenes, and moisture is an excellent accelerator or accessory agent.[9,10] These nitro compounds, or products derived from them, add chemically to the rubber since the nitrogen content of the acetone-extracted vulcanizates increases with the time of vulcanization, and the unsaturation decreases.[11,12]

At least part of the polynitrobenzene is reduced, and some oxidation also takes place during vulcanization; for example, *m*-dinitrobenzene is reduced in part to what appears to be dinitroazobenzene and dinitroazoxybenzene.[10]

Hard rubber types can be obtained with large propor-

[1] Paper presented before the Division of Rubber Chemistry at the ninety-eighth meeting of the American Chemical Society, Boston, Mass., Sept. 11 to 15, 1939. Abstracted from *Ind. Eng. Chem.*, Nov., 1939, pp. 1381-89.
[2] U. S. Industrial Alcohol Co., Stamford, Conn.
[3] Parkes, British patent No. 11,146 (1846).
[4] Boggs, *J. Ind. Eng. Chem.*, 10, 117 (1918); Williams, *Ibid.*, 15, 1020 (1923).
[5] Whittelsey and Bradley, U. S. patent No. 1,607,331 (1926).
[6] Le Blanc and Kröger, German patents Nos. 408,306 and 409,214 (1925).
[7] Bedford and Sebrell, *Ind. Eng. Chem.*, 14, 25 (1922); Bruni and Romani, *Giorn. chim. ind. applicata*, 3, 351 (1921).
[8] *J. Russ. Phys. Chem. Soc.*, 44, 204 (1912); India Rubber World, 80, 3, 55 (1929); *Rubber Chem. Tech.*, 2, 489 (1929); Chap. 7 in Davis and Blake's "Chemistry and Technology of Rubber," A. C. S. Monograph 74, New York, Reinhold Pub. Corp., 1937.
[9] Wright, *Trans. Inst. Rubber Ind.*, 12, 183 (1936); *Rubber Chem. Tech.*, 11, 131 (1938).
[10] Wright and Davies, *Trans. Inst. Rubber Ind.*, 13, 251 (1937); *Rubber Chem. Tech.*, 11, 319 (1938).
[11] Blake and Bruce, *Ind. Eng. Chem.*, 29, 869 (1937).
[12] Stevens, *J. Soc. Chem. Ind.*, 36, 107 (1916).

tions of polynitrobenzene and litharge and a small proportion of water.[10]

BENZOYL PEROXIDE. The vulcanizing action of this substance was also discovered by Ostromislensky.[13] It is very active, but the vulcanizates do not age well. The vulcanizates contain benzoyl peroxide in chemical combination.[11,14] Van Rossem[14] showed that one-third of the reagent is extractable as benzoic acid and one-third as potassium benzoate after treatment with alcoholic potassium hydroxide. Van Rossem postulates that benzoyl peroxide may act as a hydrogen acceptor and that two molecules of the rubber hydrocarbon may thus be united at the places where the hydrogens are lost. The unsaturation of the vulcanizate decreases as vulcanization progresses.[11] In the discussion of van Rossem's paper Bock[15] showed that by using equimolecular portions of rubber (calculated as C_5H_8) and benzoyl peroxide, a hard insoluble product is formed.

DIAZOAMINOBENZENE AND ITS DERIVATIVES. Buizov[16] reported the use of diazoaminobenzene as a vulcanizing agent in 1921, but the long abstract of his article in *Chemical Abstracts* does not mention the fact. Its use was rediscovered later by Levi[17] and Fisher.[18] These agents do not require the presence of any other substance, and they give clear transparent vulcanizates, some of which age well. A gas which is probably nitrogen is given off during the reaction and sometimes makes the products porous. 2,4,6,2′,4′,6′-Hexachlorodiazoaminobenzene gives excellent products which are transparent like molded pale crepe. In this case part of the reagent was found by Shinkle and Fisher[19] to have been converted into the corresponding hexachlorodiphenylamine. The formation of this substance and of the gaseous nitrogen indicates that an oxidation-reduction reaction takes place during the vulcanization. At the same time part of the agent evidently adds in some form to the rubber hydrocarbon since the vulcanizate contains more nitrogen than is found in the original crude rubber.[19] The hydrogen atom on the diazoamino group,—N=N—NH—, is not the point of action since compounds in which it is replaced by a methyl or a benzyl group work even better than the unsubstituted parent substance. *N*-Benzyldiazoaminobenzene has some of the properties of an ideal non-sulphur agent, since not only is it a good vulcanizing agent, but it is also its own accelerator and antioxidant.

QUINONES AND HALOGENATED QUINONES were found by the writer,[20,19] to vulcanize rubber at 141° C. and, in the case of the halogenated quinones, also at room temperature. During the vulcanization a portion of the quinone is reduced to the hydroquinone which blooms out. In the case of the halogenated quinones it was found that a portion of the agent adds in some fashion to the rubber hydrocarbon. Spence and Ferry[21] reported that quinone and tetrachloroquinone produce "enhanced polymerization" of the rubber in latex, especially under irradiation. All the quinones give much better results in the presence of oxidizing agents such as lead dioxide, red lead, ferric oxide, mercuric oxide (yellow), and lead chromate. Large proportions of tetrachloroquinone in rubber form products which are hard and brittle. Theoretical considerations of the action of quinones are given below.

QUINONE MONO- AND DIIMINES. These types, especially their *N*-aryl derivatives, were discovered by the writer[18] to vulcanize rubber similarly to the quinones and also to give much better results in the presence of oxidizing agents. Spence and Ferry[21] mention quinonediimine as giving enhanced polymerization. The *N*-aryl derivatives are generally red and are at least partly reduced to the corresponding *p*-hydroxydiarylamines and *N,N′*-diaryl-*p*-phenylenediamines, which are white and bloom out. These vulcanizates age very well.

QUINONE MONO- AND *bis*-HALOIMINES. These substances are very active vulcanizing agents.[18] On account of their activity vulcanization takes place sometimes on the mill or while the specimens are awaiting their turn at the press. Quinone dichlorodiimine is also mentioned by Spence and Ferry.[21]

QUINONE MONO- AND DIOXIMES.[18] Quinone monoxime is a tautomeric form of *p*-nitrosophenol and works best in the presence of oxidizing agents. Quinone dioxime gives good vulcanizates alone, but works best in the presence of oxidizing agents, and its activity is increased by a great many different kinds of oxidizing agents. It also adds in some way to the rubber hydrocarbon since the vulcanizates contain more nitrogen than that in the original crude rubber.[19] The methyl ethers of both quinone mono- and dioxime act even better as vulcanizing agents than the parent substances.

SUBSTANCES WHICH REQUIRE THE PRESENCE OF OXIDIZING AGENTS. Many of the substances which vulcanize rubber only in the presence of oxidizing agents are related to the quinones and their nitrogen derivatives discussed above. The work on some of them has been patented,[18, 20] but much of it has not yet been published by the writer. The oxidizing agents which give the best results are lead dioxide, yellow mercuric oxide, manganese dioxide, vanadium pentoxide, and lead chromate. Sometimes all of them give good results with the same compound, but occasionally one gives much better results than any of the others. The organic substances are listed, and only the chief members tried are included. Their theoretical implications will be discussed later.

Dihydric Phenols. Hydroquinone, and its halogenated derivatives, resorcinol, catechol, 4,4′-dihydroxydiphenyl.

Monohydric Phenols. Phenol and the cresols, their halogenated derivatives, mesitol, pentamethylphenol, and the naphthols.

Mercaptans. *p*-Thiocresol, thio-*β*-naphthol or *β*-naphthyl mercaptan, and mercaptobenzothiazole.

Phenolic Derivatives. *p*-Hydroxydiphenylamine, *p*-hydroxyazobenzene, *p*-benzylaminophenol, *p*-benzalaminophenol.

Di-sec-aromatic Amines. *N,N*-Diphenyl-*p*-phenylenediamine, 1,3,5-trianilinobenzene, *N,N′*-diphenylbenzidine, and 5,5-dimethylacridan.

Primary Aromatic Amines. Aniline, the toluidines, mesidine, pentamethylaniline, *m*-nitraniline, the naphthylamines, and *p*-aminoazobenzene.

Secondary Aromatic Amines. Diphenylamine, phenyl-*α*-naphthylamine, phenyl-*β*-naphthylamine, benzeneazodiphenylamine.

GRIGNARD REAGENTS AND ZINC ALKYLS. The vulcanizing activity of these substances was demonstrated by Midgley, Henne, and Shepard[22] who showed that they acted only when the rubber hydrocarbon contained a trace of chemically combined oxygen. Tensile strengths of 135 to 160 kg. per sq. cm. (1,925 to 2,275 pounds per square inch) were obtained. The Grignard vulcanization can be reversed, and the recovered rubber revulcanized with a Grignard reagent (the first and only instance ever reported of a complete devulcanization). Apparently no attempt has been made to vulcanize this recovered rubber with sulphur and compare its properties with other sulphur vulcanizates from natural rubber.

[13] *J. Russ. Phys.-Chem. Soc.*, 47, 1467, 1904 (1915); INDIA RUBBER WORLD, 81, 3, 55 (1929); *Rubber Chem. Tech.*, 3, 195 (1930).

[14] van Rossem, Dekker, and Prawirodipoero, *Kautschuk*, 7, 202, 220 (1931); *Rubber Chem. Tech.*, 5, 97 (1932).

[15] *Kautschuk*, 7, 224 (1931).

[16] *J. Russ. Phys.-Chem. Soc.*, 53, 166 (1921); *C. A.*, 18, 1588 (1924).

[17] *Gomma*, 1, 4 (1937); *Rubber Chem. Tech.*, 10, 471 (1937).

[18] French patent No. 806,500 (1936); British patent No. 475,034 (1936); U. S. patent No. 2,170,191 (1939).

[19] Unpublished data.

[20] U. S. patent No. 1,918,328; British patent No. 390,045; French patent No. 740,978 (1933).

[21] *J. Am. Chem. Soc.*, 59, 1648 (1937).

[22] *Ibid.*, 56, 1156 (1934).

N,N'-Dichloroazodicarbonamidine ("Azochloramide") belongs to the aliphatic group and has the following structural formula:

$$Cl-N=\underset{\displaystyle NH_2}{\underset{|}{C}}-N=N-\underset{\displaystyle NH_2}{\underset{|}{C}}=N-Cl$$

A mixture of five parts in 100 of pale crepe was found[19] to give the following results in a press at 141° C.:

Time Min.	Tensile Strength Kg./Sq. Cm.	(Lb./Sq. In.)	Set* Inch	Elongation %
15	39	(554)	0.21	910
90	46	(648)	0.21	920
150	72	(1025)	0.18	910

*The set is the difference between the length of an original one-inch section before and just after break.

All the samples were porous, probably from nitrogen gas formed during the vulcanization. It is of interest to compare the structure of this reagent with that of the quinone dichloroimines mentioned above.

Inorganic Vulcanizing Agents. The writer frequently found that fairly good vulcanizates were obtained with some substances in the presence of yellow mercuric oxide. They bore such a resemblance to one another that it was thought the oxide might be the actual agent; therefore it was tried by itself. The results showed that mercuric oxide is a vulcanizing agent and that its action is increased in the presence of stearic and other acids.

Lead dioxide is a pro-oxygen and gives very sticky samples, but, when properly handled and heated in a press for 180 minutes at 141° C., a mix containing 30 parts of lead dioxide gives a product which is sticky, but by hand tests has certain characteristics of a vulcanizate. In benzene a sample swelled and showed no signs of dissolving after four days, but three weeks later it was completely dispersed. Perhaps this is a borderline case.

Selenium dioxide has a peculiar action on rubber which may be akin to vulcanization.

Potassium ferricyanide, and to a lesser extent, mercuric chloride, ferric chloride, and pentamminocarbonatocobaltic nitrate, showed enhanced polymerization of rubber in a specially prepared latex when heated in the absence of air.[23]

Theories of Non-Sulphur Vulcanization

The vulcanizates prepared with non-sulphur agents are so similar to those obtained with elemental sulphur that by simple inspection it is practically impossible to differentiate them. The range of their properties is great, just as the range of the properties of sulphur vulcanizates is great. Some types of agents give a wide range of properties, some a narrow range; some give strong products, some weak; some give typical T-50 tests, and some do not.

The proportions of many of the non-sulphur agents required for vulcanization are similar to those of sulphur, provided the molecular size of the agent is taken into account. For example, four parts of tetrachloroquinone on 100 of rubber give excellent results alone, but especially in the presence of lead dioxide. Since the molecular weight of tetrachloroquinone is 246, this amount would correspond to 0.52-part of sulphur. Only one part with an oxidizing agent gives a good vulcanizate, and this small amount corresponds to only 0.13-part of sulphur. Also one part of 2,6-dichloroquinone-4-chloroimine with two parts of lead dioxide gives a vulcanizate with a tensile strength of 76.5 kg. per sq. cm. (1,088 pounds per square inch), and this one part corresponds to 0.15-part of sulphur. Similar figures could be shown for other agents. These amounts are close to Bruni's calculated figure of 0.15 for approximately the lowest proportion of combined sulphur possible to give definite vulcanization.

[23] Spence and Ferry, *J. Soc. Chem. Ind.*, 56, 246T (1937).

Since all of the vulcanizates have so much in common, it is likely that the vulcanization reaction is fundamentally the same. A complete theoretical explanation of the action of sulphur has not yet been put forth, and it is impossible at present to explain the action of the non-sulphur agents. However, theories are worth using since they help us to understand natural phenomena and act as guides for further research. Good as our present theories may be, they must be changed when it is necessary in order to interpret new facts properly.

Several important generalizations can be made regarding non-sulphur vulcanization:

1. Most of the agents are oxidizing agents in the broad meaning of the term.
2. Those that are not oxidizing agents require the presence of an oxidizing agent.
3. All combine chemically in some unknown form with the rubber hydrocarbon.
4. The unsaturation of the rubber hydrocarbon decreases as the chemical combination of the agent increases, wherever such studies have been made.
5. From observation only, it appears that all the groups which combine with the rubber hydrocarbon are or contain polar groups.
6. It is not necessary to have either sulphur or oxygen in the organic molecule in order to have a vulcanizing agent.
7. The fundamental action which is common to all vulcanization is oxidation-reduction.

As will be shown later, these generalizations agree nicely with those for the chemistry of sulphur vulcanization. In discussing the theory of the action of some of these agents and its development, we will start with the quinones since they were the first group studied by the writer.

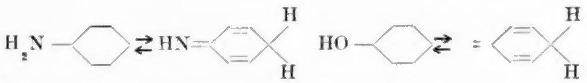
At first it was thought that the quinones added to the rubber or that the rubber added to the quinones, as hydrocarbons are known to do, and that the reaction was completed by the oxidizing action of an unreacted portion of the quinone which is thus reduced to the corresponding hydroquinone. If another oxidizing agent was present—for example, lead dioxide—it was thought that this reoxidized the hydroquinone back to the quinone which, in turn, reacted with the rubber. It happened, however, that the vulcanizates containing the lead dioxide were always much better than those without it. Also the quinones studied in the early work were the halogenated quinones, especially tetrachloroquinone (chloranil), and this substance is insoluble in rubber; whereas the corresponding tetrachlorohydroquinone is soluble and blooms out. The simple vulcanizates always showed the bloom of tetrachlorohydroquinone, but the lead dioxide mixtures, provided there was enough lead dioxide present, did not. This fact was interpreted as indicating that all the hydroquinone was completely reoxidized to the quinone. It was also found that mixing tetrachlorohydroquinone itself in rubber along with lead dioxide gave excellent vulcanizates. Later work showed that red lead could replace lead dioxide with tetrachloroquinone, but that it could not replace it with tetrachlorohydroquinone. No bloom was obtained also when red lead was used. Lead dioxide will oxidize tetrachlorohydroquinone outside of rubber to tetrachloroquinone, but red lead will not. However red lead will form a salt with tetrachlorohydroquinone which is insoluble in the rubber and, therefore, it will not bloom out. These facts indicate that the reaction may be chiefly between the rubber and the hydroquinone, and that the chemical combination thus formed is then oxidized to what we know as the vulcanizate by the action of an oxidizing agent. The question then comes up, how does the quinone vulcanize rubber? It is probably first reduced to the hydro-

quinone by the reducing action of non-rubber constituents and the rubber hydrocarbon, and then the action goes on as just given.

The rather thorough study of this reaction apparently settled the mechanism of the reaction, and work with other substances seemed to bear out these conclusions: namely, that the reduced form of the substance, provided there are two such related forms, reacts with the rubber, probably adding to it at double bonds, and then this addition product is oxidized to give the vulcanizate. Just what this final form is chemically has not yet been determined. It is a difficult problem, but no doubt it will be solved one of these days.

Besides the oxygen derivatives several types of nitrogen derivatives related to quinone (quinonimines) work satisfactorily under the same general conditions, and the chemical reaction is probably the same. Many of the oxygen and nitrogen derivatives are very active and will vulcanize rubber at room temperature, some even on the mill.

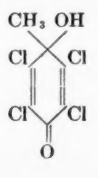
Not only did all the halogen derivatives of quinone tried give very good results, but also the simple quinones, including certain naphthoquinones. Hydroquinone, with an oxidizing agent, vulcanized rubber; and catechol and resorcinol, with an oxidizing agent, likewise caused vulcanization. It should be mentioned that anthraquinone has not yet been made to work satisfactorily. All these reactive substances have two reactive groups in them, and this fact fitted in nicely with the bridge theory. Then came the surprises; simple primary and secondary aromatic amines also work in the presence of an oxidizing agent (some of them very well) as well as simple phenols and thiophenols. Since the amines and phenols can form quinones by oxidation or can exist, at least theoretically, in the quinonoid form by tautomeric rearrangement,



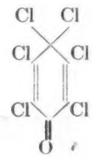
it may still be that these also fall in the same general class as the quinones and the quinonimines. Whether the rubber adds to the quinonoid structure or whether the active hydrogens of the quinonoid structure or of the hydroxyl or imino groups add to the double bonds in the rubber are questions which cannot yet be settled. Further work in an effort to help settle the matter showed that pentachlorophenol, tetrabromo-*o*-cresol, tetrachloro-*p*-cresol, mesitol, and even pentamethylphenol, with lead chromate as the oxidizing agent, give excellent vulcanizates. In these examples all the other hydrogrens on the nucleus are replaced. The halogens could be considered as somewhat labile and, therefore, possibly reactive, but the methyl groups in pentamethylphenol are very stable. But this can also exist in the quinonoid form and could fit into one of the two general schemes.

The addition of amines,[24] phenols,[25] and thiophenols[26] to unsaturated hydrocarbons is known. Generally catalysts such as concentrated sulphuric acid and an amine hydrochloride are necessary, and sometimes temperatures above those ordinarily used for vulcanization are required. However there is no theoretical reason why these substances should not add to the rubber hydrocarbon.

A quinole, 2,3,5,6-tetrachloromethylquinole,



was prepared and tested since it has the quinonoid structure and yet is not a quinone. It was tried alone in rubber, and with lead dioxide, zinc oxide, and a mixture of red lead and magnesia, all of which work well with tetrachloroquinone; but the signs of vulcanization were meager. The lead dioxide mixture was "short" and might have been overcured. A similar compound with a quinonoid structure, hexachlorocyclohexadienone,



was also tested and gave a definite although weak vulcanizate. These results are not against and yet they are not strong for the quinonoid theory.

Perhaps a modification is necessary similar to that mentioned especially by van Rossem *et al.*[14] in his study of vulcanization with benzoyl peroxide: namely, that hydrogen atoms, attached to carbon atoms adjacent to the position where the reagent adds are oxidized off, and thus the two sections can form a bridge between two molecules or they can unite two parts of the same molecule.

To summarize, the quinonoid structure is an active grouping, is found in many of the vulcanizing agents, and therefore may play a part in the chemistry of vulcanization. However a further study of all the reactions indicates that the hydroxyl, amino, and imino groups may play an even more important part. The active grouping catalyzed perhaps by the oxidizing agent present seems to add to the rubber, and then this addition product seems to be oxidized to form the vulcanizate. Many reduced substances have been found and identified in vulcanizates prepared with tetramethylthiuram disulphide (tetramethylthiuram monosulphide), *m*-dinitrobenzene (probably dinitroazoxybenzene), benzol peroxide (benzoic acid), hexachlorodiazoaminobenzene (hexachlorodiphenylamine), quinone (hydroquinone), tetrachloroquinone (tetrachlorohydroquinone), *N*-phenylquinonimine (*N*-phenyl-*p*-aminophenol), quinone-*bis*-phenylimine (*N,N'*-diphenyl-*p*-phenylenediamine), etc.

It was found by experiment that tetrachlorohydroquinone does not readily add to the rubber hydrocarbon under the same conditions of vulcanization. From a mixture of rubber and tetrachlorohydroquinone after the usual heating in a press, all the tetrachlorohydroquinone could be extracted. This observation is not against the addition of this reagent since, as mentioned above, a catalyst is generally necessary for such a reaction.

If the mechanism of practically all, if not all, the nonsulphur agents involves an oxidation-reduction reaction, how does sulphur itself fit into this picture? The author postulates that if sulphur reacts as these other substances seem to do, since it exists in the oxidizing condition, it should first be reduced to hydrogen sulphide which, in turn, should add to the rubber, and then the rubber-hydrogen sulphide addition product should be oxidized by the remaining elemental sulphur to form the vulcanizate. This is logical although it may seem somewhat revolutionary. Let us look briefly at sulphur vulcanization and then see how well this hydrogen sulphide theory fits the facts.

(*To be concluded*)

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[24] Hickinbottom, *J. Chem. Soc.*, 2646 (1932); 319, 1981 (1934); 1279 (1935).
[25] Königs, *Ber.*, 23, 3146 (1890); Königs and Carl, *Ibid.*, 24, 179, 3889 (1891); Königs and Mai, *Ibid.*, 25, 2650 (1892).
[26] Posner, *Ibid.*, 38, 646 (1905).

Cutting the Bud-Slip

A bud-slip, a narrow thin slice of wood and bark with a bud near the middle, is being cut from a stick of budwood. The bud is below the center of the knife. From 10 to 25 buds can be obtained from one yard of bud-wood, depending on the clones used.

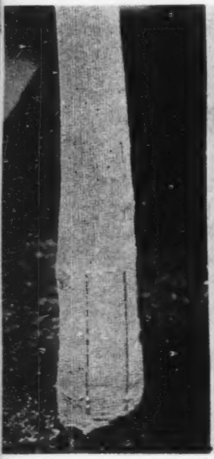
Preparing the Bud-Patch

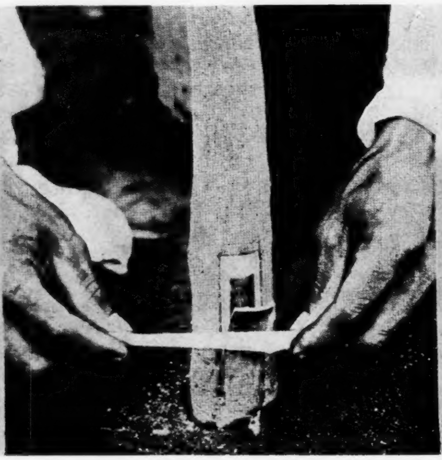
A. The bud-patch is the bark of the bud-slip after separation from the underlying thin slice of wood. Above, the edges of the bud-slip are being trimmed before stripping the bud-patch.

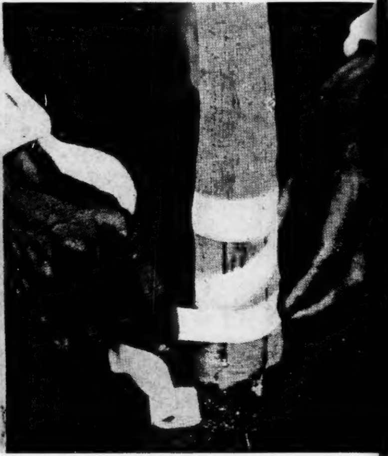
B. The bud-patch is now separated from the wood of the bud-slip. The layer of living tissue called the "cambium," between the bark and the wood, must not be damaged, or touched by fingers. The position of the bud is indicated by a small, raised, pale green lump, and the bud-patch is useless if the bud is damaged.

Preparing the Bud-Patch

C. Finally the ends of the bud-patch are trimmed with a slanting cut so that the patch fits better when it is placed under the flap of the stock. The patch is now ready for grafting.







Preparing the Stock

The plant to be budded, called the stock, should be a healthy seedling, from 10 to 18 months old and one to 1½ inches in diameter at four inches above ground level. The lower end is cleaned with a rough knife; then cuts are made, as above, with a budding knife. Any latex flowing out is allowed to coagulate and is removed before the bark is opened and the bud-patch inserted.

Inserting the Bud-Patch

The flap or tongue of bark marked by cuts is gently opened, and the bud-patch inserted with the bud pointing upward. The exposed wood of the stock and the inside of the bud-patch must not be touched. The tongue of bark may also be cut so that it can be opened from the bottom for insertion of the patch.

Binding the Bud-Patch to the Stock

A. The tongue is pulled gently back toward the stock with a waxed bandage, not with the fingers. The top end of the tongue is fixed in position by winding the waxed bandage once firmly around the stock.

Binding

B. After fixing the top end of the tongue, the bandage is taken to the bottom. The stock is then firmly bound, working from the bottom of the tongue to just above the top. Binding is done upward to prevent rain water from running inside the bandage.

Bud-Grafting Procedure[1]

Of interest to the user of rubber are the methods, evidenced by these photographs, which have been evolved in an effort to produce better quality rubber and to increase unit output with a view to lower cost. The results of research in plantation technique are manifested in the extreme care which is necessary to insure success.

Bud-grafting or budding means taking a bud from one tree and making it grow on another tree. It is done to obtain a large number of high-yielding trees quickly and easily. The method is to take a bud from a special high-yielding tree and to graft it on to an ordinary seedling plant. The plant is then cut off just above the grafted bud, and this bud grows and becomes the new tree. The new tree is called a bud-graft, or a budding, and is like the tree from which the grafted bud was taken. By taking buds from special high-yielding trees and grafting them like this, as many high-yielding trees as are wanted can be obtained. From the first budded trees more buds can be taken and used for bud-grafting. The second lot of buddings will be like the first lot, and so on for further buddings. Thus, by bud-grafting, it is possible to obtain any number of high-yielding trees which are all alike. Many important details are connected with choosing and testing the original trees and first buddings, but these need not be discussed here.

The budded trees which have been obtained by multiplication from one original tree form a "clone." Anyone who wishes to bud-graft should use only "proved clones." These are clones that have been tested for many years and are allowed a special assessment under the Rubber Regulation Enactments.

To begin with, budwood, or budded stumps, of the proved clones must be bought. Afterward anyone can multiply this budwood for himself, but great care is necessary to make sure that clones are not mixed with worthless plants. Some clones are "proprietary clones." They

[1] Abstracted from Planting Manual No. 8, The Rubber Research Institute of Malaya, Kuala Lumpur, Federated Malay States.

are owned by companies who will sell budwood or budded stumps only if the buyer signs an agreement not to sell to anyone else. Others are "non-proprietary clones" or "free clones." They can be used and sold freely without any agreement.

As regards the method of planting and establishing budded rubber trees, in most cases it is best to plant ordinary healthy seeds or seedling stumps and bud-graft the plants growing from them in the field about a year later. Bud-grafting can also be done in the nursery, and the budded plants transplanted to the field either as "budded stumps" or as "stumped buddings." By these methods a little time might be saved, but the risk of loss is great. ("Budded stumps" are transplanted soon after cutting back, before the grafted bud has started to grow. "Stumped buddings" are buddings which have been allowed to grow in the nursery, usually for about a year, and then pulled up, trimmed, and transplanted like ordinary stumps.)

"Clonal seedlings," which are seedlings grown from seeds collected from budded trees, are sometimes used as stocks for bud-grafting. It is possible that buddings made

Binding

C. The top end of the bandage is pressed into the bark of the stock, causing a little latex to exude which assists in the adhesion of bandage to tree. The bandage is then rubbed downward, pressing the folds of waxed cloth together. Besides this method others utilize as binding materials: bamboo pieces, tire carcass sections, dried mengkuang leaf, or coconut leaf. They are fastened to the stock by wire or strong string and generally require that the tongue of the stock be opened from the bottom.

Tying or Leaf-Shade

A shade of rubber leaves from the stock plant is tied over the bandage as an added protection from sun and rain.

Opening

The leaf-shade and waxed bandage are removed in not less than two weeks in wet weather and three weeks in dry weather. The tongue is removed by cutting it just above the bud-patch and breaking it off at the bottom. The bud-patch will have grown firmly on to the stock, and, if the bud-patch is still green and healthy ten days later, the graft has been successful.. If the bud-patch is dead, the stock may be budded again on the opposite side.

Cutting Back the Stock

As soon as a successful budding is evident, the stock is cut off a few inches above the bud-patch. There is no harm in delay, except the loss in time. Until the stock is cut back the grafted bud remains "dormant" and does not grow. Because of this fact plants can be budded in nurseries several weeks before they are required for transplanting.

The Young Budding

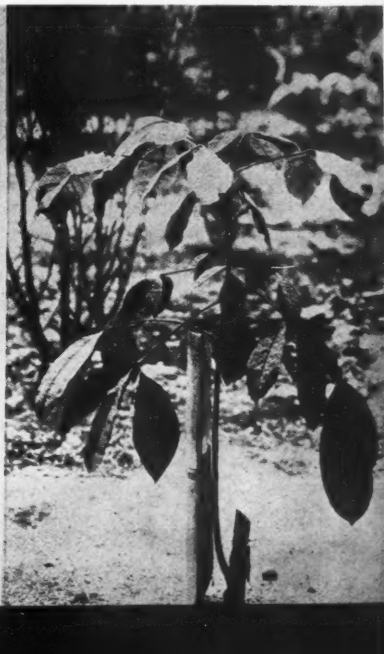
A. Two to four weeks after cutting back the stock the grafted bud begins to grow. The bud-shoot produced, called the "scion," after growth forms the new tree. The picture above was taken seven weeks after budding and three weeks after cutting back. Other shoots which come out of the stock must be broken off to assure growth of the scion.

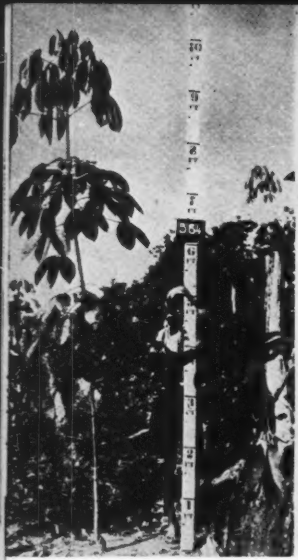
The Young Budding

B. This plant is shown five months after budding. The section above the bud-patch, which is called the "snag," will fall off as the scion grows. However, if the stock is larger than two inches in diameter, the snag should be pruned at this time.

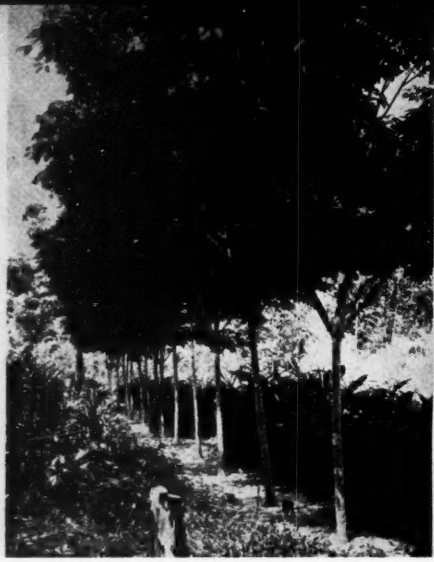
Bamboo Shield

A shield of split bamboo that is fixed close to the young budding affords protection and promotes straight growth of the plant.





One-Year Old Budding Ten Feet High
Note the union of stock and scion near the ground.



Three-Year Old Buddings

Nine-Year Old Buddings in Tapping

Tapping
Because the stock was originally larger than the scion, the base of the tree is still noticeably larger than the trunk.

on clonal seedling stocks will be better than those made on ordinary stocks. This is being studied now.

There are still many rubber growers who do not like bud-grafting and who hope to obtain high-yielding trees by planting "clonal seeds." Reports regarding clonal seeds have sometimes been misleading. It is true that some clonal seeds will give high-yielding trees, but clonal seeds collected from any particular area of buddings are so mixed that they may also produce a large proportion of poor trees. Bud-grafted trees of any one clone are all alike, but trees grown from clonal seeds are not. Before clonal seeds from any particular area of buddings can be recommended for planting, they must be "proved" in much the same way as many clones have been proved. This takes about ten years. "Proved clonal seeds" are at present difficult to obtain and are much more expensive than bud-grafting. For these reasons, and for other reasons too involved to explain here, it is best to bud-graft.

Latex-Casein Adhesives[1]

CASCO flexible latex-casein cements, which combine the flexibility of rubber with the adhesive properties of casein glue, find many applications in bonding dissimilar materials. According to the degree of flexibility required, more or less latex is used, and the dried cement film may contain anywhere from 90 to 10% rubber. For large-scale use the casein glue and latex are combined at the point of application. Special casein glue formulae have been developed for mixture with latex.

Casco flexible cements vary in consistency, but can be thinned with water. Application may be by brushing, troweling or spraying. They are said to be heat- and water-resistant. The ability to stretch slightly without losing their strength is said to make these cements suitable for the adhesion of materials that have different rates of expansion and contraction under heat and humidity changes.

The following applications are suggestive of the use of Casco flexible cements for industrial and building purposes: gluing—metal to wood or fiberboard, fiberboard to glass or resinoids, rattan to canvas, rawhide to wood and metal, heat insulation materials to metal and enamel, and felt or rubber to bases of trays, bookends, etc., of wood, metal, earthenware, etc.; combining—leather and canvas, canvas and paper, cork with paper or metal, metal foil and paper; attaching wall and floor coverings—rubber, cork-treated fabrics, and linoleum to plaster, fiberboard, wood, or concrete; sealing cartons; laminating chipboard and combining special papers for outdoor exposure; and adhering labels to metal, glass, etc. For home, school, and office use, the cement is supplied in a collapsible tube as an all-purpose adhesive.

[1] Products of the Casein Co. of America, 350 Madison Ave., New York, N. Y.

Low-Temperature Set Test

THE low-temperature behavior of stretched rubber has been used in recent years as the basis of the T-50 test for measuring the degree of vulcanization. A recent paper[1] by J. H. Fielding points out, however, that the T-50 test is not the only means possible for expressing this low-temperature effect quantitatively. According to this paper, a simpler method has been developed, which yields surprisingly precise results. The new method is known as the 0° set test.

In the 0° set test the sample is stretched to a predetermined elongation, immersed in ice water for two minutes, released, held in ice water one minute, and measured. The result is expressed as "per cent set," based on the original unstretched length, or as "fractional set," based on the initial elongation.

The only equipment necessary for the 0° set test comprises a stretching clamp and a constant-temperature bath. The temperature of melting ice (0°C.) is the easiest low temperature to maintain constant and is used for that reason. Within certain limits, however, any other constant temperatures would be suitable. For 0° C. work all that is required is a sufficient supply of ice and means for circulation of the bath.

The author of this paper admits that the 0° set test will not cover the same almost unlimited range of cure as will the T-50 test. However it is not at a practical disadvantage because it is applicable over a good part of the curing range of most present-day tire compounds. Further, it has the definite advantage of simplicity in equipment, cooling medium, and manipulation. As a control test, it could be carried out by a person unfamiliar with chemical laboratory equipment.

[1] "Low-Temperature Set as a Measure of State of Vulcanization." *Ind. Eng. Chem.* (*Anal. Ed.*), Jan., 1940, pp. 4-9.

Distributers' Tire Stocks in the United States, January 1, 1940[1]

THE results of the quarterly survey of retail stocks of automobile tires and inner tubes, as of January 1, 1940, are shown below in comparison with summary data for preceding quarterly surveys; the bases and methods described in previous reports have been used in calculating the stocks held by the following three groups of distributers: 1. individual dealers, including large and small retailers; 2. distributers through oil-company chains; 3. manufacturer-owned-and-operated stores, mail-order houses, and other important retail chains.

Distributers' Stocks Indicated by Surveys

Total distributers' stocks of motor vehicle casings on January 1, 1940, are estimated at 7,010,000, an increase of 151,000 from October 1, 1939, somewhat greater than the increase of 75,000 during the final quarter of 1938, and bringing the total 517,000 above January 1, 1939. The fourth quarter increase was the direct result of restocking by oil-company distributers, declines being shown in stocks of individual dealers and chain stores. Each group of distributers was holding larger stocks at the beginning of 1940 than at the beginning of 1939, and the aggregate stocks were only slightly less than at the beginning of 1938. Considering the greater concentration of tire volume in a small range of sizes, casings stocks are now relatively higher than they were two years ago. Considering the higher total replacement business during 1939 in comparison with 1938, stocks have only shown a pro rata increase during the past year and are lower than they were two years ago.

	Thousands of Casings			
1940	Dealers	Oil Companies	Other	Total
January 1	2,996	2,000	2,014	7,010
1939				
October 1	3 122	1,487	2,250	6,859
July 1	2,900	1,646	2,356	6,902
April 1	3 018	1,725	2,074	6,817
January 1	2,735	1,838	1,920	6,493
1938				
October 1	2.588	1,840	1,990	6,418
July 1	2,767	2,079	2,163	7,009
April 1	3,007	1,869	2,051	6,927
January 1	3,015	2,115	1,920	7,050
1937				
October 1	3 000	1,774	2,289	7,063
July 1	3.363	1,996	2,299	7,658
April 1	3,835	1,853	2,304	7,992
1936				
Estimated	3,500	1,650	2,000	7,150

	Thousands of Inner Tubes			
1940	Dealers	Oil Companies	Other	Total
January 1	3,310	1,671	1,532	6,513
1939				
October 1	3,220	1,406	1,793	6,419
July 1	3,206	1,393	1,829	6,428
April 1	3,460	1,626	1,588	6,674
January 1	3,445	1,733	1,599	6,777
1938				
October 1	3,132	1,781	1,727	6,640
July 1	3,560	1,805	1,786	7,151
April 1	4,021	1,918	1,728	7,667
January 1	3,547	2,127	1,717	7,391

The current survey shows distributers holding 92.9 inner tubes for every 100 casings, against 104.3 tubes a year earlier and 105.5 two years earlier. Company-owned stores were the first to reduce the ratio of tubes to casings, then other chains, then oil companies, and finally the large and intermediate sized dealers. Naturally, savings in inventory carrying charges result somewhat from this decline, which is rendered possible by increased concentration of tube business in a few sizes and influenced to some extent by the less customary purchase of new tubes with new tires by motorists.

Dealers' Reported Stocks

The stocks reported by 1,294 individual dealers for 1,725 stores in the current survey are compared below with the stocks reported by the same firms October 1, 1939. Reduced stocks of both casings and inner tubes are shown for the two groups with less than 500 casings; while increased stocks are shown for the larger dealers. The overall result is a net reduction in stocks of casings, but a net increase in the stocks of inner tubes held by individual dealers.

The slight decline in casings stocks during the final quarter of 1939 is anti-seasonal as compared to the experience in 1938 and 1937; while an increase in tube stocks is normal during the final quarter.

Number of Casings	Number of		October 1, 1939		January 1, 1940	
	Casings	Tubes	Casings	Tubes	Casings	Tubes
Under 200	901	1,028	86,772	111,677	73,341	106,974
200 - 500	241	349	84,263	89,742	74,984	85,095
Over 500	152	348	194,012	175,255	201,819	188,274
Total	1,294	1,725	365,047	376,674	350,144	380,343
Other January	635	865	......	......	170,870	195,916
Total January	1,929	2,590	......	......	520 914	576,259
Index Numbers	......	......	89.2	92.0	85.6	94.6

As a result of special circularization of dealers who had previously reported, but not regularly, in the surveys, the total number of returns was increased from 1,803 in October to 1,929 in the current survey. It is hoped that most of the dealers who reported for January will regularly submit data in future surveys, increasing the comparative sample, which should improve reliability of our conclusions.

Oil Company Distributers' Reported Stocks

Reports were received from 35 identical firms distributing tires through chains of filling stations, some reports covering stocks in central warehouses only, while others also covered stocks in over 15,000 retail outlets in the October and January surveys. Restocking by these distributers is indicated for the period, much more for casings than for inner tubes.

	Comparative Totals		Other
	October 1	January 1	January 1
Number of firms	35	35	3
Casings	816.565	1,098.938	3,793
Inner tubes	758,119	918,286	4,202
Index numbers:			
Casings	90.1	121.25	....
Tubes	85.2	101.3	....

[1] Special Circular Vol. 14, No. 1, Rubber Section, Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Other Mass Distributers' Stocks

Reports were received from six tire manufacturers operating 2,083 (October—2,133) retail stores and covering stocks held in these outlets, and from eight other mass distributers operating 1,929 (October revised—1,944) stores and covering their total stocks as of January 1. The manufacturers stores were holding 977,651 casings or very close to the same aggregate stocks as on October 1, but their stocks of tubes (790,465) declined 38,000. The other firms reported reduced aggregate stocks of both casings and tubes. Stocks reported here by manufacturers are presumably also included in manufacturers' inventory as reported by The Rubber Manufacturers Association, Inc.

	Reported Comparative Data	
	October 1	January 1
Number of firms	14	14
Number of stores	4,077	4,018
Casings	2,249,747	2,013,856
Tubes	1,793,199	1,532,408

Stocks of New York Dealers

Stocks reported by 119 New York dealers with 148 stores in the current survey amount to only 25,415 casings and 30,661 tubes, against 46,331 casings and 63,044 tubes by only 94 dealers with 116 stores last October. Of those reporting January 1, 83 held under 200 casings each, 23 between 200 and 500 casings, and 13 over 500 casings each, the sharp decline in reported stocks resulting mostly from non-receipt of reports from certain large dealers.

Acknowledgment

The support of The Rubber Manufacturers' Association, Inc., the assistance of the National Association of Independent Tire Dealers, and the cooperation and promptness of dealers, oil-company distributers, manufacturers, and other mass distributers, in submitting data used in this report, is gratefully acknowledged. We especially thank those dealers who have submitted data for January 1 and urge them to report regularly in future, as regularity is essential to trustworthy estimates of total dealers' stocks. The survey is open to participation by any tire dealer, and we will be glad to hear from dealers desiring to furnish data in order to receive our summary reports. Members of local dealer associations can assist us by bringing this matter to the attention of their local groups.

Conveyers for Extruding Operations

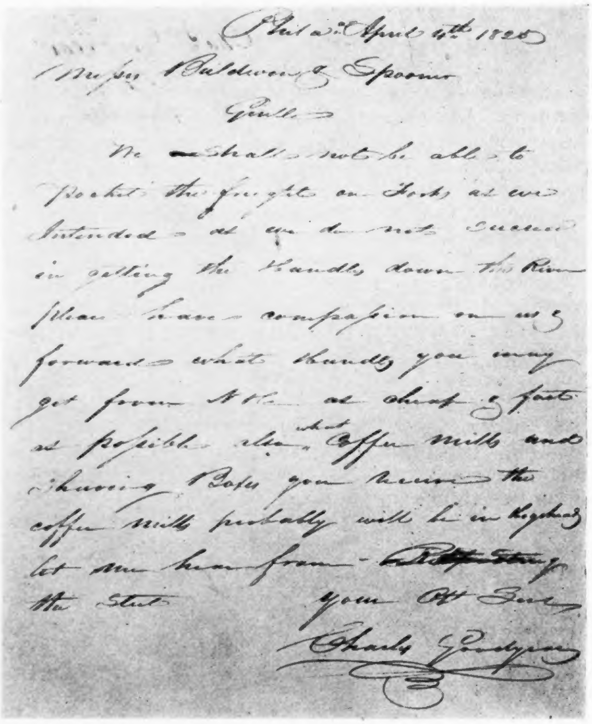
Freshly extruded rubber normally issues from the die in a soft, easily impressionable state and, until vulcanized, must be handled with care. Improperly timed take-off may result in buckled and uneven walls· undue porosity, surface cracking, etc. Moreover tubing machines are sometimes run under capacity speeds for want of adequate take-off. Abortive adaptations of conveyers originated for other purposes and inefficient makeshifts may result in a loss of material and labor.

To provide for proper take-off control and to permit top extruder speeds, John Royle & Sons, Paterson, N. J., is now designing custom-built apron or belt conveyers adapted for this work. Each machine is designed for its special application. Features include: welded steel framework, aluminum belt runways, variable speed reducers and motors, and independent adjustment for loading and delivery ends.

Oldest Goodyear Relic

A LETTER written by Charles Goodyear, believed to be the oldest existing Goodyear relic, recently came into the possession of Ralph F. Wolf, of the technical staff of The B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ont. The letter, dated April 4, 1825, pertains to Goodyear's hardware business. The oldest previously known letter from the discoverer of vulcanization is at the Yale University library, dated Salem Bridge, August 15, 1833.

In writing the missive the inventor omitted all punctuation and one or two words, as was characteristic of his "Gum Elastic," the autobiography he wrote 28 years later. The letter in full, punctuated to make it more understandable, follows the facsimile reproduction below.



Messrs. Baldwin & Spooner,

Phila., April 4th, 1825.

Gentle.

We shall not be able to pocket the freight on Forks as we Intended as we do not succeed in getting the Handles down the River. Please have compassion on us and forward what Handles you may get from N.H. as cheap and fast as possible, also what Coffee Mills and Shaving Boxes you receive. The Coffee Mills probably will be in Hogsheads. Let me hear from Respecting the Steel.

Your Ob't Ser't.

Charles Goodyear

The letter, written on ordinary eight by ten notepaper, was not enclosed in an envelope, but was folded three times, sealed with wax, and addressed on the outside to "Messrs. Baldwin & Spooner, Merchants, New York." As postage stamps did not come into use until 1840, the letter bears none, but is postmarked "Phil 5 Apr" with a hand stamp.

Rubber for Pressing and Forming of Metals[1]

Paul Grodzinski

THE high elasticity of rubber and its special property of sustaining high stress and strain without permanent deformation has been utilized for many years for the production of bowls and bottle-like bodies of soft metals such as copper or brass by means of easy deformable rubber inserts. However these methods did not originally prove successful owing to the low mechanical properties of the rubber compositions applied. Today not only the general mechanical and physical properties of rubber have been improved, but special rubber qualities have been now evolved for this special problem.

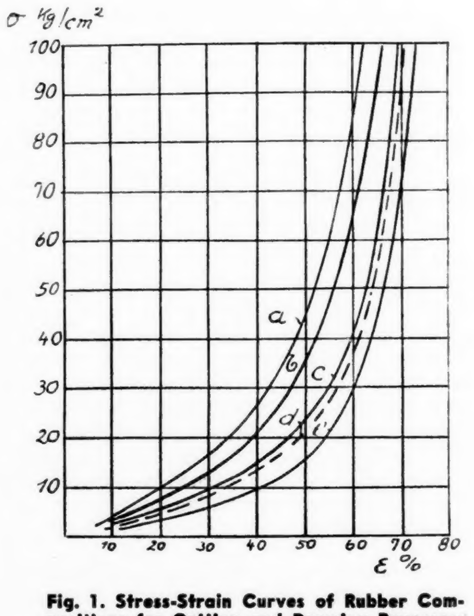


Fig. 1. Stress-Strain Curves of Rubber Compositions for Cutting and Drawing Purposes; The Materials Shown Have the Following Moduli of Elasticity for Zero-Stress, Eo: (a) 51.5 kg/sq.cm., (b) 41.0 kg/sq.cm., (c) 30.6 kg/sq.cm., (d) 29.0 kg/sq.cm., (e) 21.0 kg/sq.cm.

In Figure 1 the stress-strain curves of some rubber materials suitable for pressing and forming purposes are given. The curves show that at low specific pressures a relatively great deformation of the rubber body is caused, and can be progressively reduced, i.e., at larger pressure only a relatively small deformation is caused. It may be mentioned that the forming action of the rubber pad starts at pressures between 258 and 560 pounds per square inch; above these pressures flowing of the sheet material is caused, and the deep drawing action starts.

Investigations have been carried out to determine if it may be possible to restrict the use to only three different rubber qualities with Shore hardnesses of 30, 50, and 60. The following operations can be performed with rubber stamps: (*a*) plain rubber pads for cutting and forming of ribs by means of metallic stencils; (*b*) rubber-forming pads; (*c*) deep drawing operations.

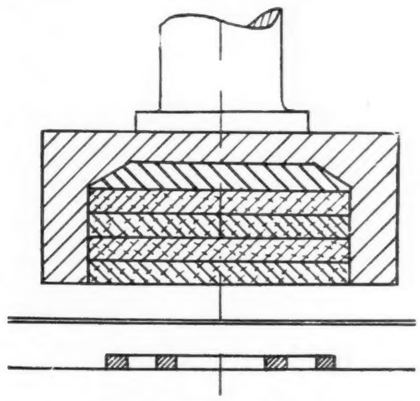


Fig. 2. Plain Rubber Pad and Metal Stencil for Cutting and Forming Purposes

With reference to (*a*) the stencil consists of the usual bright steel having a thickness of about ¼-inch. The rubber pads (Figure 2) are composed of several thick layers of the special rubber compounds mentioned above. The rubber sheets are fixed in a special holder fitted at the ram of the eccentric press. For the embossing of metal letters matrixes of hard lead are used, cast from simple patterns, and the punch consists of several plain rubber plates each having a thickness of about ¾-inch (Figure 3). The dimensions of the retaining strips must correspond exactly to the size of the lower base plate to avoid any creeping of the rubber. With the same top punch a number of various shapes can be embossed; this method is, therefore, very economical for the production of parts in small lots.

The production of sections from light metals (*b*) is facilitated by the application of rubber-forming pads having roughly the inside form of the sections to be produced.

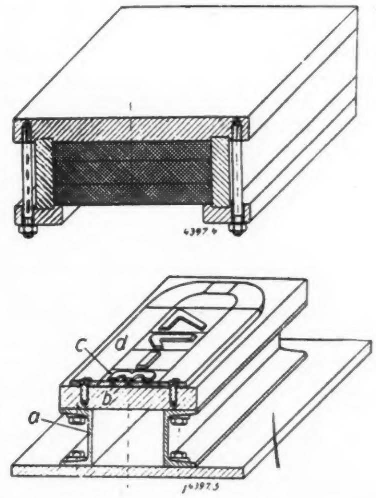


Fig. 3. Rubber Pad for the Stamping of Metal Letters (a) Steel Sections; (b) Base Plate; (c) Exchangeable Stencils, (d) Exchangeable Stencils for the Size of Board

[1] Abstracted from *Rubber Age (London)*, Nov., 1939, pp. 269-70.

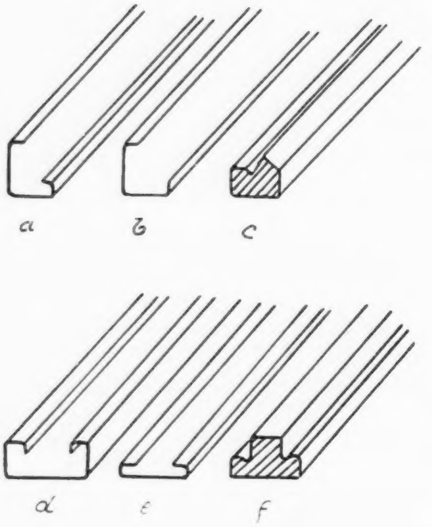


Fig. 4. Rubber Forming Pads: a, b Sections (Usually of Light Metals); c, Rubber Pad for Sections a and b; d, e Sections (Usually Light Metals); f, Rubber Pad for Sections d and e

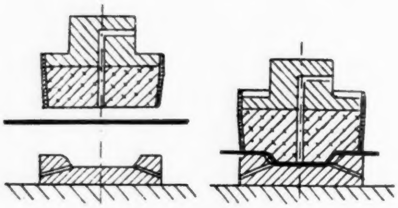


Fig. 5. a and b, Deep-Drawing Die with Rubber Stamp: (Left) before the Pressing; (Right) During Pressing

Figure 4 shows some of these shapes, together with the rubber pads. Only one press stroke is necessary to perform such an operation whereas hitherto five to six passes had to be applied.

Figure 5 shows a rubber drawing die. The matrix can be made of any suitable material according to the special conditions and the number of pieces required. The punch is made of rubber and on small and medium-sized tools it is covered by a sheet metal holder to restrain the sidewards deformation of the rubber under load. The rubber pad serves simultaneously as a blank holder whereby the holding pressure increases with the deformation of the work piece.

U. S. Retreading Increases [1]

FROM Bureau of Census statistics on camelback production for 1937 and incomplete Rubber Manufacturers Association statistics of camelback sales for 1937, 1938, and 1939, approximate yearly sales are indicated to have been: 34,126,000 pounds in 1937; 40,100,000 pounds (17.5% increase) in 1938; and 49,700,000 pounds (23.7% increase) in 1939.

Considering the available data on exports of tire repair materials by value, the probable trend of exports of other materials than camelback included in these figures, and data on unit values, it is estimated that probably 1,500,000 pounds of camelback were exported in 1936, 1,750,000 pounds in 1937, the same in 1938, and 2,000,000 pounds in 1939.

An average of six estimates of "what the national average consumption of camelback per casing might be" for 1938 gave 8.66 pounds, and an average of seven estimates for 1939 gave the slightly lower figure of 8.56 pounds. An increased tendency toward recapping in place of retreading and a trend toward new molds requiring less camelback were noted as reasons for lower estimates for 1939 than for 1938; while an increased percentage of truck tires treated was mentioned as a counterbalancing influence. It appears, from information received, that the 1937 figure would have been estimated at about 9.00 pounds, as recapping was then not so general.

Applying data on the number of pounds of camelback per casing and camelback sales, including exports, the number of casings retreaded or recapped in recent years would work out as follows: 3,600,000 for 1937; 4,430,000 for 1938; and 5,570,000 for 1939. While the basic data are faulty and the average of estimates such as to render conclusions uncertain, the above figures are offered as helpful to market analysts. It is certain that the number of units retreaded increased greatly during 1939 despite the sharp increase in replacement sales of new tires during the same period.

[1] Abstracted from *Rubber News Letter*, Jan. 31, 1940, pp. 18-19.

Pliofilm Packaging Process

THE Naturalpak process[1] and apparatus was developed to make possible the preservation and sterilization in an inexpensive package of all food products now packed in tin cans and glass jars. The foods are placed in an envelope bag of Pliofilm, which is heat sealed and placed in sealed vapor-tight chambers. After sterilization of the food under heat, the bags are pressure cooled, removed from the cooking chambers, and placed in folding cardboard boxes. Each box is wrapped tightly in cellophane and then placed in shipping containers. If preferred, the products may be completely packed as described above before sterilization, thus eliminating rehandling.

The advantages claimed for the new process are many. By eliminating tin cans and therefore can-openers, microscopic particles of metal which may be sheared off by can-openers will not be deposited in the food. The cost of the new package is said to be about 50% under that of tin cans. Because of the square or rectangular shape of Naturalpak containers, smaller shipping container costs are realized and also more packages can be accommodated in the cooking chambers. It is claimed that the saving in shipping weight amounts to about 20%, while the saving in space is about 30%.

In the home, foods in Naturalpak containers may be readily heated by placing the inner Pliofilm bag in a pot of boiling water for five to ten minutes. This method assures retention of natural flavors and vitamins. Also, packages containing different food products may be heated in the same pot.

In adopting the Naturalpak process the canner or packer does not have to scrap any of his existing equipment and has very little additional equipment to purchase. It should be pointed out that Naturalpak is not a package invention, but only relates to a process and apparatus for the preservation and sterilization of all food products. The process was developed and perfected by Duryea Bensel.

[1] Bensel-Brice Corp., Los Angeles, Calif.

Rubber—An Aid in Oil-Well Shooting

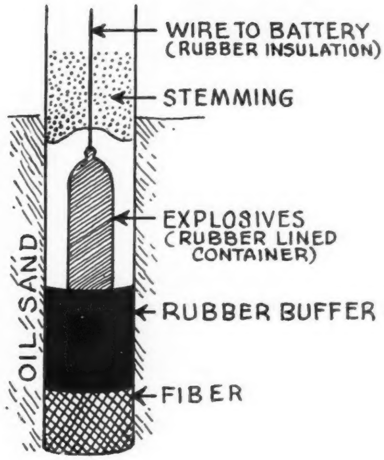
F. R. Cozzens

IN THE petroleum industry newly drilled wells are invariably brought into production by detonating a quantity of explosives in the sand-face. The purpose of the blasting is to create a reservoir and open channels whereby oil can drain into the well. The types of explosives commonly used are nitroglycerin and blasting gelatin, in amounts ranging from 100 to 1,000 pounds, and even at depths exceeding 3,000 feet their action can be controlled from the surface with the exception of one salient feature. Explosive force, like water, follows the course of least resistance, and there is a kick downward as well as toward the sides and surface. This downward kick quite often proves disastrous in that the bottom of the reservoir may become broken and crumbled, allowing the oil to escape into the soft shales underneath. In many districts the extreme low portion of an oil-sand is often saturated with water, and the downward force of a blast may open crevices which would permit the entry of sufficient water to ruin the well. Since these conditions can seldom be remedied once they have occurred, the proper course is to prevent their happening. In the reclaiming of stripper oil fields in Ohio, West Virginia, and Kentucky, this is being done in a high percentage of cases by the use of a resilient rubber buffer.

When the modern operator drills a well through an oil-producing sand, careful measurements are taken, and from these measurements he determines the exact place near the center of the sand-face where the oil-reservoir is to be located. He then dumps down the hole two or three bags of short-fiber asbestos, which is followed by a cylindrical block of molded rubber, one foot in length and a trifle smaller than the inside diameter of the casing. This block is forced down into the casing by the weight of the drill until it fits snugly upon the fiber packing in the bottom of the hole. After the drill is withdrawn, a metal shell containing the required amount of explosives is lowered by means of line and reel, until it rests on top of the rubber block. Earth stemming is poured down upon the shell until it extends up the hole to a point six to ten feet above the cone or shell-top. Insulated wire, which has previously been connected to an electric blasting cap in the pack, is next drawn taut; the casing is removed, and the charge is exploded by an outside battery.

The resilient buffer interferes in no way with the side-action of the blast, but the downward force is broken, thus preventing under-crumbling. The rubber and the fiber are driven into any bottom crevices which may exist; and as both materials are expansive after pressure is removed, leakage of the reservoir is eliminated entirely. The rubber buffer may be seated at any point along the sand-face by the introduction of more or less fiber, and scrap rubber may be used instead of the molded block in cases where the latter form is not obtainable. To produce the required effect the rubber pack must be twelve inches or more in length; its diameter in all cases is controlled by the size of the casing. The standard diameter of the latter is eight inches.

In addition to its use as a buffer, rubber is an essential accessory in various other capacities in the shooting of oil wells. The metal shell which holds the explosives is lined with soft adhesive latex, and the magazine for storing explosives is lined with rubber sheeting. The wire, connecting the charge to the outside battery, is insulated with rubber, and the electric cap and exposed connections are wrapped in waterproof tape, containing an adhesive rubber compound. The reel over which the charge is lowered has rubber brakes; and breakers, cut from rubber tubing, are commonly used over the casing to eliminate danger of premature explosion from stray electric sparks or currents.



In these capacities rubber can be replaced with no other known material. It is adaptable to any oil and gas field requirement, and the diverse ways in which rubber or rubber-composition products may be utilized mean greater speed and efficiency for both the field crew and the operator.

Metal Casting Process[1] Utilizes Rubber Molds

Novelties and jewelry, made from soft metal such as tin, white metal and lead, are produced by a centrifugal casting process which makes use of rubber molds. The apparatus comprises: a centrifugal casting machine, a steel vulcanizing frame, a gas-heated vulcanizing oven, and a melting pot with temperature control. The casting machine will accommodate a nine-inch circular rubber mold with a center working space, three inches in diameter and will cast pieces up to ¾-inch thick. The rubber compound used in the molds limits the process at present to metals and alloys with a melting point up to 600° F. A composition is being developed, which, it is believed, will be able to withstand temperatures up to 1000° F.

The principal advantage claimed for the new process is that it does away with expensive bronze molds. Furthermore from one piece to 72 pieces may be cast simultaneously in one mold, depending upon the size of the pieces. The casting process requires approximately two minutes; thus 30 castings per hour can be made. The cost of a single mold, including the cost of rubber and labor, is approximately $5. From this mold 15 to 100 gross of castings can be produced.

[1] Alrose Chemical Co., Cranston, R. I.

EDITORIALS

A New Package for Crude Rubber

SINCE the advent of plantation rubber in sheet form the development of a proper protective package for export shipment from the plantation has been more or less continually under discussion.

In attempting to satisfy the requirements for an ideal package it has been necessary to give consideration to certain conditions of importance to the plantation, the carrier, and the consuming rubber company. The factors affecting the producer are principally the availability and economics of the package; while the steamship carrier is primarily interested in its handling and stowing characteristics as well as the liability for claim, and the consumer regards cleanliness of the rubber with absence of contamination as the prime requisite.

In the early days the heavy wooden box and later the laminated plywood case have been a continual source of splinters which adhered to and often became embedded into the rubber bale either during transit or at the point where the rubber was removed from the case. Also the metal banded burlap or similarly covered bale resulted in difficulty and a loss to the rubber consumer because of embedded band iron and contamination caused by rupture or by adhesion of the covering material to the rubber.

On page 33 of this issue a description is given of a new method of packing smoked sheets in which rubber itself, in the form of a cement-sealed wrapper or bag, is used as the protecting agent for the internal bale of rubber. This medium appears to be most logical as it is readily available on the plantation, thus eliminating the procurement problem and the cost of an extraneous package which has little worth upon arrival. While the intrinsic value of the rubber wrapper to the rubber consuming company is a point in favor of this new package, the greatest and most desirable advantage lies in the element of cleanliness and absence of contamination to the internal rubber, a condition toward which the consumer's efforts have been continually extended.

As is usual in the instance of any innovation, some readjustment of customary incidental practices will be necessary in order to insure an extended use of this type of package. Probably the most important factor in its success will be the care exercised in choosing the location of stowage during steamship transportation. However, as in many other instances, continued use will result in an increasing acceptance and eventual realization of the precautionary measures as regular practice.

Although there has been some indication of a desire on the part of crude rubber exporters to further the use of this new package, the real effective impetus toward its extended adoption will necessarily present itself in the form of individual contract demands. A display of interest and urgent requests from the company members of the consuming industry will undoubtedly be the controlling factor. From the results of previous shipments and from the favorable attention already received, this rubber-protected bale appears to have advantages that overshadow the possible disadvantages, of which many may be eliminated through continued use. Although its adoption for all types of plantation rubber is not yet indicated, this package appears worthy of more extensive trial.

Potentiality of Plastics to the Rubber Manufacturer

RECENTLY I received a letter which contained this statement: "It is very definitely my opinion that the use of plastics in the rubber industry will be the next large-scale development in this industry. My belief is that the rubber industry has been very slow in investigating and accepting some of those new and interesting materials."

The writer of that letter, engaged in technical activities for a rubber company, has shown by past performance that foresight can serve well and that progress is closely associated with practical application of new developments. His expressed ideas stimulate thought and appear basically sound.

In a December, 1938, Survey, 20 producers of hard rubber indicated no intended adoption of resinous plastics and only four companies were active in or expected to manufacture such products.

The so-called commercial plastics are allied to rubber, particularly as regards the processing methods and, frequently, the applications. With continued advancements in rubber and plastics, increased overlapping of processes is probable. Future developments may even enable the adaptation to rubber vulcanization of the injection molding principle now common to plastic forming.

Because of their decorative versatility, plastics have invaded the field previously served by hard rubber. Although the use of plastics is already quite diversified and embraces many consuming industries, the technical development may be considered as relatively incomplete.

However the improvement and utilization of plastics appear to have gained the momentum necessary to enable the acquisition through further research of more extended knowledge. Undoubtedly within the next decade additional and more specialized materials will enlarge the utility of the resulting products. As in the case of rubber, future expansion will be governed very largely by the accessibility of factual information to the design engineer. In view of the growing trend in this direction, which is indicative of a larger field, these new materials appear to justify the attention of rubber companies.

S. C. Stillwagon

EDITOR

What the Rubber Chemists Are Doing

A. C. S. ACTIVITIES

Detroit Group Hears Yost on Dynamic Fatigue

MEETING at Webster Hall, Detroit, Mich., on February 1, the Detroit Group, Rubber Division, A. C. S., opened its 1940 season with an attendance of 150 members and guests, the largest since the group's inception three years ago. W. Nelson, new group chairman, presided. Dr. F. L. Yost, Physical Research Laboratory, United States Rubber Co., presented a paper on the "Dynamic Fatigue of Rubber," which aroused considerable discussion among those present. The highlights of Dr. Yost's paper are presented below.

The general dynamic fatigue characteristics of rubber in linear vibration in a dark, dry enclosure are as follows: (1) for a given oscillation stroke, the dynamic fatigue life is a minimum when $L_{min.}$ (minimum length during the vibration)$=L_0$ (free unstrained length); (2) for a constant value of $L_{min.}$, the dynamic fatigue life decreases as the oscillation stroke increases; (3) for given strain limits of oscillation, the dynamic fatigue life is usually lower for harder stocks; and (4) the dynamic fatigue life depends to a large extent on the rubber temperature. The dynamic fatigue life of rubber worked in shear can be related to the dynamic fatigue life of rubber vibrated through linear strains.

The next meeting of the group, tentatively set for mid-April, will be devoted to a subject related to automotive engineering.

Los Angeles Group Holds Non-Technical Meeting

WITH 89 members and guests in attendance, the Los Angeles Group, Rubber Division, A. C. S., held its first meeting of 1940 on February 6 at the Mayfair Hotel, Los Angeles, Calif. In the absence of Group Chairman W. C. Holmes, Lee Horchitz, vice chairman, presided. The group was entertained by Paul Livingstone, who told of his experiences while touring the United States with his wife for three years without the expenditure of any cash. Mr. Livingstone covered 85,000 miles, with all of his expenses paid by those he solicited during the trip. The program was completed by a discussion and motion picture on the recent Spanish civil war, presented by Russell Palmer, of Palmer Publications.

The secretary announced that owing to the resignation of B. E. Dougherty, of the B. E. Dougherty Co., as vice chairman, and W. B. Reeder, of U. S. Rubber Co., as secretary, the executive committee had appointed Lee Horchitz, The B. F. Goodrich Co., and Fred Woerner, The C. P. Hall Co. of California, as vice chairman and secretary, respectively

A decanter set, donated as door prize by the Sparkletts Bottled Water Co., was won by D. J. Pitcher, U. S. Rubber Co. A table radio, gift of the Kirkhill Rubber Co., went to G. Krough, also of U. S. Rubber. Cigars, provided by E. L. Royal, of H. M. Royal, Inc., were distributed during the dinner.

Chicago Group Hears Dr. Neal Discuss Accelerators

A. M. NEAL, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., spoke on "Aims of Present-Day Accelerator Research" before the 100 members and guests present at the February 9 meeting of the Chicago Group, Rubber Division, A. C. S., at the Hotel Sherman, Chicago, Ill. Dr. Neal's paper, which created considerable interest, pointed out some of the more obvious shortcomings of present-day accelerators and some of the improvements which may be expected in the next few years. A second speaker, Professor J. Schommer, Armour Institute of Technology, spoke on the following subject, "Is Football Overemphasized?"

The next meeting is scheduled for March 15 at the Hotel Sherman. The address of the group's secretary, B. W. Lewis, has been changed to Wishnick-Tumpeer, Inc., Research Laboratory, 6130 W. 51st St., Chicago, Ill.

Boston Group to Hold Plastics Symposium on April 5

APRIL 5 is the date set for the next meeting of the Boston Group, Rubber Division, A.C.S., to be held at the University Club, Boston, Mass.

The technical program of five papers will consist of a symposium on plastics. The first speaker will be Professor C. E. Reed, Massachusetts Institute of Technology, an expert on this subject. He will describe the two fundamental classes of plastics, pointing out the general physical and chemical properties of each class. Professor Reed's paper will be aimed at furnishing a background for the other four papers which will cover the applications of four types of plastics. These materials, which are either being used in conjunction with rubber or to replace rubber in certain applications, are the vinylites, acryloids, cellulose derivatives, and polyisobutylenes. Papers on these plastic materials will be presented by qualified speakers from: Bakelite Corp., Resinous Products Co., Hercules Powder Co., and Standard Oil Co. of New Jersey (Plastics Division). Twenty minutes will be allotted for each paper, followed by a brief discussion. A motion picture, to be shown before dinner and covering different phases of plastics manufacture and use, will round out the program.

Buna and Plastics Subjects for New York Group Meeting

THE next meeting of the New York Group, Rubber Division, A. C. S. will be held at the Building Trades Employers' Association, 2 Park Ave., New York, N. Y., on March 15. The technical session will be held at 4:30 p.m.; while dinner will be served at at 6:30 p.m. At the technical session, C. A. Norris, Bakelite Corp., will present a paper entitled, "Plastics Up-to-Date," followed by a motion picture on plastics, "The Fourth Kingdom." The second speaker, Per K. Frolich, of Esso Laboratories, will talk on "Buna Synthetic Rubber," American production rights of which were recently secured by Standard Oil Co. of New Jersey.

The prize essay contest, sponsored by the group last year, will be continued this year. Rules, which will be issued shortly, will be essentially the same as last year's when the contest was open to New York Group members under 35 years of age. Harry L. Fisher, of U. S. Industrial Alcohol Co., and H. M. Wakefield, of the Bakelite Corp., have agreed to serve as 1940 judges, and a third judge will be chosen later. All essays should be sent to C R Haynes, Binney & Smith Co., 41 E. 42nd St., New York. The deadline for receipt of essays will be about September 3.

The annual outing will be held in the middle of June this year, probably at a club somewhere in Westchester County, N. Y.

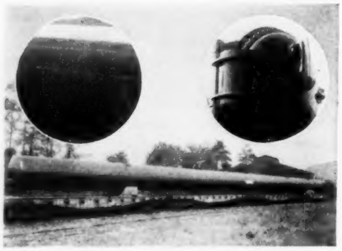
Vanderbilt Announces Fine-Particle Calcium Pigment

UNUSUALLY high tear resistance is said to be produced in white or brightly colored rubber goods through the use of Kalvan, a new calcium carbonate pigment of extremely fine particle size, developed after five years of research. According to the manufacturer, Kalvan has a particle size of 1/10 micron. Stocks containing Kalvan, as compared with those containing whiting, are said to have five times greater tear resistance and 50% higher tensile strength. Manufactured by the Diamond Alkali Co., Pure Calcium Products Division, Painesville, O., the pigment is now being distributed by the R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y.

New Machines and Appliances

Longest All-Welded Pressure Vessel

WHAT is believed to be the longest all-welded unfired pressure vessel ever manufactured in this country was recently completed for a timber processing company to use in creosoting timber products, but it could be modified easily for use as a steam or air pressure vulcanizer. The vessel, made possible by a special welding procedure, is 160 feet long and six feet one inch in diameter. The shell is of 5/8-inch steel, with a 7/8-inch head, and weighs 111,000 pounds. Four railroad flat cars were required for shipment. The cylinder is anchored in the middle and supported on rollers to allow expansion and contraction with temperature changes. The vessel has a quick-opening door and two banks of steam coils to heat the creosote. In the illustration, the insert at the left shows a close-up of the weld; while the one at the right shows the quick-opening door. The Treadwell Construction Co.

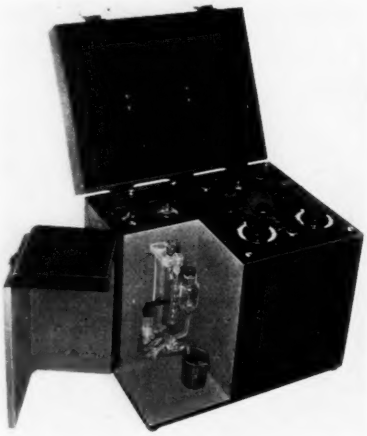


All-Welded 160-Foot Vessel

Four-Press Rubber Molding Unit Features Compact Design

A MOLDING unit of striking appearance is compactly made up of four hydraulic presses with single panels covering the entire unit, both front and rear. Each press has three openings with 36-inch square platens. Press capacity is 450 tons with 2,000-pounds-per-square-inch working pressure. Built into the center section of the unit are pumps, accumulators, and control valves.

Each press is provided with a temperature control recording instrument. The time cycle, independent of temperature control, is automatically controlled by means of a push button and provides for automatic bumping. A second push button on each press controls the molding shelf which is raised and lowered by an electrically operated elevator instead of the more usual hydraulic elevator. All instruments and controls are flange mounted on the front panel. The French Oil Mill Machinery Co., Piqua, O.



Cambridge Electron-Ray pH Meter

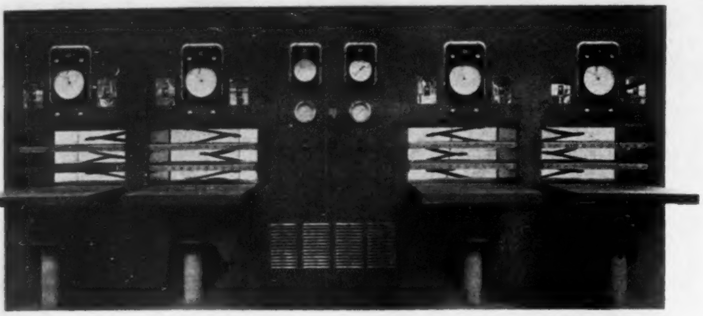
Electron-Ray pH Meter

A UNIQUE feature of the Electron-Ray pH meter is in its null-indicator. Instead of a delicate pointer galvanometer, an electron-ray tube, having a variable width beam on a fluorescent screen, is used. This provides the required sensitivity and has the advantage that it cannot be injured by any possible mis-manipulation, even by the most inexperienced operator. By adjusting the electron-ray beam to a narrow slit, the null point is quickly and accurately determined.

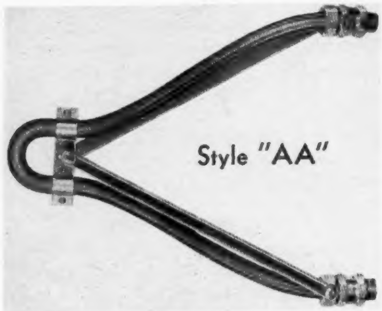
The instrument utilizes a glass electrode firmly attached to a calomel electrode assembly and reads directly in pH values or in millivolts without applying a conversion factor. A Weston standard cell permits accurate adjustment of the working current of the potentiometer circuit. The overall accuracy of the instrument is 0.02 pH. This accuracy holds on measurements of from one to nine pH. For values outside of this range the accuracy is subject to the usual limitations of a high-grade glass electrode. There are two models, one for battery operation and one for 110- to 125-volt A.C. operation. When turned on, the A.C. model is said to be ready immediately for pH measurement without the necessity of waiting through a warming-up period. The only battery used in the A.C. model is a dry cell furnishing the working current for the potentiometer circuit. Battery model is operated by self-contained dry batteries of standard type. Cambridge Instrument Co., Inc., 3732 Grand Central Terminal, New York, N. Y.

Self-Supporting Flexible Connectors for Hydraulic Presses

A SEAMLESS flexible metal tube connector for the platens of a hydraulic press, known as the Bracketube, features a patented support which holds the tubing in a horizontal position at the bend, thus preventing water pockets forming in the loop. The supporting mechanism controls not only the flexing of the tubing, but also its position so that the connector always remains self-draining. Recent improvements in the design of Bracketubes, which are said to promote longer life and increased efficiency, include the use of heavier self-locking screws and nuts, larger and stronger bearings, and lighter but stronger supporting arms. The Bracketube shown here is but one of four styles. The American Metal House Branch of American Brass Co.

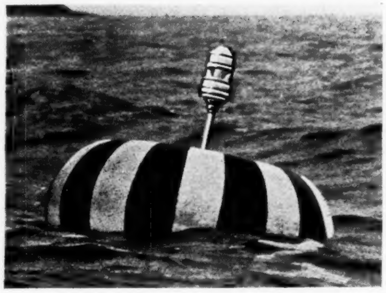


Compact Four-Press Unit



American Bracketube

New Goods and Specialties



Light Buoy with Rubber Float

Seaplanes Aided by Rubber-Floated Light Buoy

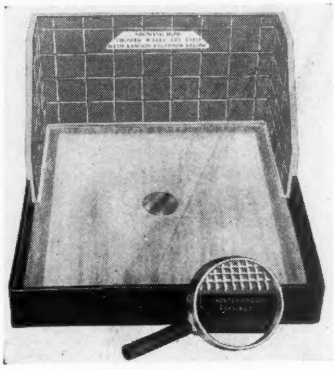
A SEADROME contact light buoy, to mark runways for seaplane take-offs and landings, has been developed by The Firestone Tire & Rubber Co. and The Westinghouse Electric & Mfg. Co. with the cooperation of the Civil Aeronautics Authority. The buoy, which weighs 185 pounds and is approximately four feet in diameter, utilizes the new fluorescent-type lighting, operated by dry cells, and a large doughnut-shaped rubber float so constructed that the light remains practically stationary even in agitated water. The float is marked with broad vertical chrome and black stripes, impregnated into the rubber to catch the eyes of fliers in day time. A special advantage of the rubber float is that it presents no dangerous hazard to the hull of flying boats or to the pontoons of seaplanes should they crash into it.

Work Shoe Soles Made of Neoprene

THE use of Neoprene-soled shoes is increasing in gasoline service stations, garages, dairies, machine shops, chemical plants, food plants, meat-packing houses, and steel plants, according to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The advantage of Neoprene in these applications is said to be due to its resistance to the action of oils, gasoline, fats, chemicals, and heat. By compounding with carbon black, the Neoprene used for these soles is made stiff and tough.

Shower Receptor with Rubber Floor and Asphalt Base

THE Lawson receptor for permanent shower stall installations combines a treaded slip-proof rubber floor with a waterproof asphalt receptor base. The asphalt base with upward extending walls is shaped and molded under heat and pressure; while the rubber floor with a chromium plated drain is molded integrally into the surface of the asphalt base. When installed, the walls of the shower stall fit inside the walls of the receptor. The Patent Products Co.



Lawson Shower Receptor

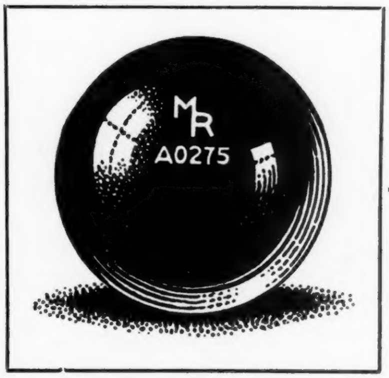
Perfect-Sphere Bowling Balls of Hard Rubber Composition

TWO new bowling balls, one of the regulation size and the other of the duckpin type, are made of special hard rubber composition. According to the manufacturer, these balls are made as near a perfect sphere as is humanly or mechanically possible, with total variation in diameter within the thickness of a human hair. Both balls are made in standard black and in multi-color paisley designs. The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.

Breather Bag for Gasoline Storage Plants

A VAPOR-SAVER system for reducing evaporation losses of gasoline at bulk storage plants utilizes as its chief component a sausage-shaped balloon or breather bag made of fabric, treated on the inside with a compound impervious to the effects of gasoline or gasoline vapor, and rubberized on the outside to give it external protection. The breather bag is 29 feet long, nine feet in diameter, and has a capacity of more than 1,600 cubic feet.

In operation in a storage plant, the bag is housed in a steel building, and pipe lines run from each tank to the bag. On top of the bag is an ordinary light wood board of a definitely selected weight. When evaporation occurs, the vapors pass through the pipes to the bag and are kept there under compression by the weight. When evaporation stops, the weight forces the vapors back into the tanks. In this manner, outside air cannot enter the system, and as the air already present is saturated, further evaporation cannot take place. That loss by evaporation constitutes a serious problem is seen in a government estimate that, during 1938, bulk plants throughout the country sustained a loss through evaporation of 317,193,060 gallons, with a value of $37,963,167. The Goodyear Tire & Rubber Co.



Manhattan Duckpin Ball

Goodrich Silvertown Industrial Cushion Tire

THE Silvertown cushion-type industrial tire, said to have advantages of both pneumatic and solid tires, is filled with a cellular-type material. The new development, according to the manufacturer, combines lightness and high cushioning qualities with sturdy construction and high load-carrying capacity. The design eliminates the hazard of puncture and servicing for inflation or tire repair. Available in two sizes, 6 by 2.00 and 8 by 2.50, the new type tire is interchangeable on the same wheel with a single-tube pneumatic tire of like size. Present application covers light hand trucks, trailers, service station grease carts, and similar industrial vehicles. The B. F. Goodrich Co., Akron, O.

Small Cushion Tire

UNITED STATES

Industrial Activity Continues Its Decline

Business recently has been characterized by a lack of resiliency and a recession in industrial production. It is believed, or rather hoped, that the current reaction to the "boom" of late '39 has run its course, and that the spring should bring an upswing. As hostilities abroad have not produced the trade anticipated, this factor is being discounted more or less in future figuring.

Unemployment still continues a major problem. The gains in employment for skilled workers, notably in shipbuilding, airplane construction, and machine tools, have been offset by declines in other fields, as steel.

Inventories will be reduced during the next few months, but it is felt larger supplies will be kept on hand than was the practice in the past few years.

Power output was down last month more than seasonally; while tin plate operations have slumped to 57%. The steel ingot rate has steadily decreased to 65.9%, the lowest since war began in Europe, and ebbing orders are cutting backlogs. The spring season, good export demand, and the gradual depletion of consumers' inventories should cause new buying to expand moderately, but no real change will be evidenced for several weeks. Auto sales are gaining; yet production has been declining.

February production of passenger car and truck units was estimated at about 360,000 vehicles, 20,000 more than earlier expectations. January output at 453,120 units was the highest on record for that month.

Lumber output, cotton mill activity, and freight car loadings fluctuated last month. Cotton mills are occupied mostly with accumulated orders. New freight cars on order January 1, 1940, were the highest since the 1926 date. The expected early 1940 dip in shoe production did not materialize, and January output was estimated at 33,000,000 pairs and February, 36,000,000, possibly because Easter is so early this year.

Airplane, machine, and machine tool plants continue very busy, some on a 24-hour basis. Brisk construction activity and further expansion of factory operations are reported in some sections. Daily oil output also rose last month.

Tire manufacturers are maintaining stable operating rates. Many rubber companies in the Trenton area report a decline in hard rubber production and in orders for most types of mechanical goods. New England manufacturers also are experiencing a letdown from the high place that prevailed last fall.

EASTERN AND SOUTHERN

Standard Oil Acquires Buna Patents; Production in This Country Assured

The Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y., has acquired from I. G. Farbenindustrie, A.G., Frankfurt a.M., Germany, all of the latter's patent rights relating to the manufacture of synthetic rubber in this country. The patents have been obtained outright and involve no royalty payments. Following the initial announcement several weeks ago, conflicting and sensational views regarding the industrial and economic implications of this development have appeared. To clarify the uncertainties surrounding this important event, we are in a position to present the following authentic information.

The patents acquired by Standard Oil are broad in their coverage and include methods for the production of all the essential raw materials (butadiene, acrylonitrile, styrene, etc.) as well as the process covering the copolymerization of butadiene with a number of different materials. At present the copolymers of butadiene with acrylic nitrile and styrene are the types of most immediate commerial importance. These have been produced in Germany for some time under subsidization by the German government. The acrylic nitrile copolymers are known as Buna N in Germany and as Perbunan in England and America, where a limited quantity of imported material has been available; those containing higher percentages of acrylic nitrile are known as Perbunan Extra. The Perbunan types have more superior properties than the other types of Buna rubbers, particularly in regard to oil and solvent resistance. The styrene copolymer, known as Buna S, is less costly than Perbunan and is being used for the manufacture of tires in Germany. Claims have come from Germany of substantially increased tire life through the use of Buna S. These have been found to be somewhat exaggerated, although with Buna S tire life is definitely higher than with natural rubber. This difference in quality is not held sufficient to compensate for the present difference in cost.

Standard Oil has offered to license various rubber companies to manufacture rubber from butadiene for consumption in their own plants. These offers have been made only to those companies who can use in their own operations quantities which make manufacture economically feasible. At present no agreements have been concluded. If rubber companies do produce Buna rubber, output in excess of their own requirements will be disposed of by Standard Oil, which reserves the right to manufacture even though rubber companies do enter into synthetic production. There has been no announcement by Standard Oil of its plans to manufacture, but undoubtedly in the event that no rubber manufacturer enters into a license agreement, Standard Oil will build a plant for synthetic rubber production, thus assuring a supply in this country. Although not definitely known, it is believed that supplies should be available within the period of a year.

Butadiene and other chemical raw materials will be made by Standard Oil, which will be in a position to supply any rubber manufacturers licensed to produce the butadiene copolymers.

No certain prediction regarding the price of this butadiene rubber can be made at this time, although it is definitely known that initially it will be substantially higher in price than natural rubber at the present market. For this reason the Perbunan type, which has wider application for specialized purposes, will be produced first. The lowering of the price in the future will depend upon increased demand and technological improvements resulting from American methods of mass production. The first production of Perbunan will be on a fairly small scale. Whether the price will ever decrease so as to justify the production of the styrene copolymer for tires and how long this would take are highly problematical. As in the case of other synthetics of this type, for the immediate future Perbunan should be considered as a supplementary raw material for the rubber industry and not as a serious competitor of natural rubber.

Butadiene for these rubbers will be made from petroleum in this country, utilizing I. G. processes modified by the replacement of coal by oil as well as American cracking processes. In Germany where oil is scarce butadiene is derived from coal. Sources of petroleum are practically unlimited here. Should our supplies of natural rubber be cut off completely, sufficient butadiene rubber to meet our rubber requirements could be produced from oil with a capital outlay commensurate with wartime expenditures.

The calendar of coming events appears on page 78 of this issue.

Binney & Smith Holds Sales Meeting

Binney & Smith Co., manufacturer, exporter, and importer of blacks, colors, clays, chemicals, and talc, 41 E. 42nd St., New York, N. Y., held a sales meeting January 30, 31, and February 1 attended by all its salesmen and representatives in the United States and Canada, including, besides home office employes, E. H. Baker, F. A. Bonstedt, and R. H. Marston, all from the Akron, O., office; C. P. Morris, from Philadelphia, Pa.; Robert Cary, Chicago; H. L. Blachford, of Binney & Smith Co., Ltd., Montreal, P. Q., Canada; M. A. Connor, of Hird & Connor, Inc., Boston, Mass.; William Tabler, of Wm. Tabler, Inc., Louisville, Ky.; B. H. Roettker, of B. H. Roettker Co., Cincinnati, O.; C. W. Hess, of C. W. Hess Co., Detroit, Mich.; T. Worum, of Worum Chemical Co., St. Paul, Minn.; Abner Hauck, of Abner Hood Chemical Co., Kansas City, Mo.; and W. J. Hoyt, of Martin, Hoyt & Milne, San Francisco, Calif. Aside from sales and technical discussion an afternoon was spent at the Columbian Carbon Co. laboratory in Brooklyn, N. Y., and another afternoon at the plant of Magnetic Pigment Co., Trenton, N. J., where Binney & Smith precipitated oxides of iron are manufactured. Entertainment was provided each evening including dinner at a popular night club and a visit to a musical comedy hit.

The company also held its annual dance on February 2 at the Hotel St. Moritz, New York, with about 300 members of the New York office and their friends present.

Lee Rubber & Tire Corp., Conshohocken, Pa., on January 25 held a stockholders' meeting which approved reducing the number of directors from eleven to nine. Robert P. Resch retired from the board, and John J. Watson, former president and chairman, died March 30, 1939.

George T. Gretton, with the Home Rubber Mfg. Co., Trenton, N. J., is wintering with Mrs. Gretton at Hobe Sound, Fla.

National Association of Waste Material Dealers, Inc., Times Bldg., New York, N. Y., will hold its twenty-seventh annual convention at the Hotel Astor, New York, on March 18, 19, and 20. On March 20 election of the president and half the directorate will take place, with the climax of the convention, the banquet, scheduled for that night. Included among the affiliated divisional associations participating in the three-day affair is the Scrap Rubber Institute. Julius Muehlstein, sales manager of H. Muehlstein & Co., Inc., dealer in crude and scrap rubber and hard rubber dust, 122 E. 42nd St., New York, who is a director of N. A. W. M. D. and vice president of the Scrap Rubber Institute, is a member of the convention committee.

Dr. Weir Returns from Brazil

Dr. James R. Weir, agriculturist and advisor on plantation developments for rubber and subsidiary crops, recently returned to the United States from an extended tour of Brazil, where he investigated the general economic conditions in the Amazon Valley, visited the Japanese colonies, and inspected the Ford rubber plantations on the Rio Tapajos, for which he was formerly advisor. In Rio de Janeiro he conferred with Brazilian leaders on the general agricultural development of Amazonia, especially with regard to a rubber plantation industry. Dr. Weir believes it possible to establish a native plantation industry for rubber and subsidiary crops in the Amazon Valley and has submitted his plan to the Brazilian government.

Dr. Weir served on the original staff of the Rubber Research Institute of Malaya, was director of research for the Goodyear Rubber Plantation Co. in Sumatra, and is now privately engaged in writing and travel.

New Monthly Business Survey Instituted by Government

The United States Bureau of Foreign and Domestic Commerce, Washington, D. C., is now sending monthly questionnaires to 1,800 companies, representative of United States productive enterprise, in order to provide American industry with current information on business movement. Information on the questionnaires includes monthly data on the value of net sales, new and unfilled orders, and of inventories. Answers are kept strictly confidential, and the data will be used only in consolidated form to indicate trends.

John A. Roebling's Sons Co., manufacturer of wire and wire products, Trenton, N. J., has announced the appointment, effective March 1, of Edward D. Emerson as general manager of sales. He had been district sales manager of Babcock & Wilcox Tube Co. since 1937 and previously sales engineer with Jones & Laughlin Steel Corp.

Nearpara Rubber Co., supplier of reclaimed rubber, Trenton, N. J., is installing new refiners and other units of machinery. Business has slowed up a little.

Endicott-Johnson Corp., Johnson City, N. Y., has announced the election on February 5 of Frank A. Johnson, superintendent of the Jigger-Sunrise factories in Johnson City, as a director to succeed H. E. Chrisfield, who resigned because of ill health. Like his grandfather, George F. Johnson, chairman of the board, and his father, George W., president of the company, the 30-year-old Mr. Johnson began his career at the bench laying soles on tennis footwear.

Notion Exhibit Introduces New Rubber Items

Rubber products played an important part in this year's National Notion & Novelty Exhibit held at the Hotel Pennsylvania, New York, N. Y., from February 5 to 10.

The Plymouth Rubber Co., Canton, Mass., displayed many products, including: aprons, bathing caps, beach accessories, rainwear, dress shields, sanitary items, infants wear, a one-piece latex beach ball, 19½ inches in diameter and latex-dipped bathing caps with sponge rubber strips to resist water seepage.

Unique rubber brushes for clothes and shoes were shown by Arthur W. Hahn Products, 199 Lafayette St., New York. The clothes brush, known as the "Duo Brush Whisk," is of laminated construction with sponge rubber on one side for removal of dirt and rubber bristles on the other side for lint. A two-way shoe brush has corrugated sponge rubber on one side and chemically treated fabric on the other side for patent leather.

Hard rubber combs were shown by the American Hard Rubber Co., 11 Mercer St., and the Bolta Comb Co., Inc., 111 Eighth Ave., both in New York. A roll-type cleaner of composition felt and rubber for walls, upholstery, window shades, and draperies was exhibited by the Nu-Dell Mfg. Co., 511 W. Huron St., Chicago, Ill. A new-type skirt hanger, of metal wire with rubber-tipped ends was shown by the Hang-O-Matic Mfg. Co., 1450 Broadway, New York. The W. J. Caley & Co., 3214 Chestnut St., Philadelphia, Pa., besides its Vassar all-rubber hair curler, displayed a new curler, made of a narrow strip of aluminum covered with rubber.

A wide range of Pliofilm products was displayed by Richard, Boggs & King, Inc., 34 W. 33rd St., New York. The exhibit featured printed Pliofilm shower curtains, table covers, etc., and a Pit-Pat-Puff powder make-up cape of lace-printed Pliofilm with a latex sponge puff. Also of interest was a raincape of Pliosheen, Pliofilm-treated silk. The Protex Products Co., Jersey City, N. J., also showed a number of Pliofilm items, including: closet accessories, food covers, curtains, and boudoir accessories. Featured new product was a transparent Pliofilm book cover.

Pollock Bros. Scrap Rubber Corp., importer, exporter, and dealer in scrap rubber, is now located in its new building at 228 Newport Ave., Brooklyn, N. Y., which was constructed to replace the former one destroyed by fire some time ago.

Martindell Molding Co., Inc., manufacturer of plastics, Trenton, N. J., experiencing a boom, is operating six days and five nights a week. The company recently installed some new equipment.

Huber Building Gas Purification Plant

Announcement was made recently that the J. M. Huber Corp. had awarded a contract to the Koppers Co., Pittsburgh, Pa., for the erection of a purification plant to treat 70,000,000 cubic feet of natural gas daily for use in the Huber carbon black factory at Borger, Tex. It is reported to be the largest plant of its kind ever built. The new plant will utilize the "Seaboard" process, based on the selective absorption of the hydrogen sulphide, by alkaline solution, under pressure.

The absorber unit is 14 feet diameter by 65 feet high, with an actifying unit of similar construction, but somewhat larger. A reclaiming unit is included for the renovation of the alkaline absorbing solution.

The laws of the State of Texas prohibit the use of "sweet" gas in the manufacture of carbon black. Gas containing not more than 1.5 grains of hydrogen sulphide per 100 cubic feet is defined as "sweet"; while gas containing a higher percentage is termed "sour" gas. The hydrogen sulphide content of natural gas varies from a trace up to as high as 1,200 grains per 100 cubic feet.

As a result of extended research, the Huber corporation has determined that the sulphur content of carbon black, which differs from elemental sulphur, is a widely varying factor in its effect on the properties of the black when compounded into rubber and printing ink. Carbon black containing sulphur in this form is said to be more difficult to disperse both in rubber and in the oils used in the manufacture of printing inks than black which is substantially free from sulphur. Poor dispersion results in lowered resistance to abrasion, an increased tendency to flex crack, and poor processing properties.

Work Projects Administration, Washington, D. C., recently reported that purchases of tires and rubber goods used on its projects totaled $3,059,000 from the time the program started in July, 1935, through September, 1939.

The WPA further reported that at present 50,000 persons are engaged in industrial research in the United States; while annual expenditures for such work average 150 to 200 million dollars. Mass-production industries, including rubber, electrical goods, petroleum, industrial chemicals, and automobiles, sponsor the greatest part of this work.

George M. Miller, of Turner Halsey Co., 40 Worth St., New York, N. Y., was one of the four directors elected at the annual meeting of the Association of Cotton Textile Merchants of New York on February 6.

Quaker City Rubber Co., manufacturer of mechanical rubber goods, Philadelphia, Pa., recently changed its name to Quaker Rubber Corp.

American Modern Pioneers Honored on Anniversary of U. S. Patent System

The program of the National Association of Manufacturers to celebrate the one-hundred and fiftieth anniversary of the United States Patent System and honor America's "Modern Pioneers," which was manifested through 13 regional dinners throughout the nation during February, was culminated in a banquet on February 27 at the Waldorf-Astoria Hotel in New York, N. Y. Details as to the purpose and method of selecting the recipients of this honor were covered on page 55 of our January issue. Through the entire program 590 men were honored for their contribution to progress and on which U. S. patents had been granted. At the final banquet in New York, 101 men received inscribed scrolls, as did also those at other regional meetings, and 19 silver plaques were awarded to men chosen from the entire country for national honors.

At the New York meeting on February 27, attended by 1,500, Robert L. Lund, chairman of the National Modern Pioneers Committee and executive vice president, Lambert Pharmacal Co., acted as chairman and also presented the awards. On the main part of the program, which was broadcast over the NBC Blue Network, the principal speaker was Charles F. Kettering, vice president, General Motors Research Corp., who spoke from his laboratory in Florida on the subject "Pioneering Never Ceases." He was followed on the broadcast program by H. W. Prentice, Jr., president, National Manufacturers' Association, and president, Armstrong Cork Co. Other speakers included Conway P. Coe, U. S. Commissioner of Patents, and Karl T. Compton, president, Massachusetts Institute of Technology.

Those associated with the American rubber industry who received awards in this national program are listed below with some factors contributing to their selection: Fernley H. Banbury, Farrel-Birmingham Co., Inc., (the Banbury Mixer); Carl L. Beal, American Anode, Inc., (electro-deposition of latex rubber on metal, and processes and equipment used in the manufacture of latex rubber products); Albert C. Fischer, Servicised Products Corp., (rubber expansion joint for highways and other rubber products); Harry L. Fisher, U. S. Industrial Alcohol Co. and formerly with United States Rubber Co., (adhesion of rubber to steel and activity in the field of rubber composition); William C. Geer, former vice president, B. F. Goodrich Co., (the "De-Icer" and the Vulcolock process of adhering rubber to metal); Harvey D. Geyer, Inland Mfg. Division, General Motors Corp., (combination of rubber and metal in shock-insulating devices, running boards, etc.); Joseph R. Ingram, Monsanto Chemical Co., Rubber Service Department, (antioxidants); Lester Kirschbraun, The Flintkote Co., (artificial dispersions of rubber in water); A. L. Murray, Auburn Rubber Corp., (stick-on half sole for shoes); Waldo L. Semon, Goodrich, (Koroseal); Robert L. Sibley, Monsanto Rubber Service Department, (antioxidants, accelerators, wetting agents, etc.); William C. Stevens, Firestone Tire & Rubber Co., (tire building and other machines); Hugo H. Wermine, Belden Mfg. Co., (soft rubber electrical plugs and connectors); and Ira Williams, J. M. Huber, Inc., and formerly with E. I. du Pont de Nemours & Co., Inc., (accelerators, antioxidants, and plasticizers).

Joint awards have been made to Sterling W. Alderfer, and Harold W. Greenup, Firestone Rubber & Latex Products Co., (rubber thread—Mr. Greenup has also patents on microporous rubber products and sponge rubber made from latex); William S. Calcott, Albert S. Carter, Arnold M. Collins, and Frederick B. Downing, du Pont, (Neoprene); Leon A. Graybill, Firestone, and Russell B. Newton, Bibb Mfg. Co., (heat-resistant cotton tire cord).

Honorable mention was awarded to Wallace E. Brown, Forest J. Funk, and Frank A. McDermott, du Pont, for developing "Ventube" made of rubberized fabric for mine ventilation. Other men well known to the rubber industry who received awards are: Howard G. Walker, Western Electric Co.; Walter S. Landis, American Cyanamid Co.; Thos. R. Harrison, Brown Instrument Co.; C. E. Mason, The Foxboro Co.; and Thomas Midgley, Jr., Ethyl Gasoline Corp.

L. Albert & Son, dealer in rebuilt rubber mill machinery, reports its three plants at Trenton, N. J., Akron, O., and Los Angeles, Calif., are busy. I. H. Albert, manager of the Los Angeles plant, is spending three months at the home office in Trenton.

Mercer Rubber Co., manufacturer of flooring and household and mechanical goods, Hamilton Square, N. J., is operating normally. Wm H. Sayen, president and treasurer, recently returned from a long business trip through the Midwest.

The Thermoid Co. employes, Trenton, N. J., in recognition of attaining one million hours without a lost-time accident between June 26, 1939, and January 1, 1940, recently won an award of merit from the Liberty Mutual Insurance Co., received in behalf of the workers by Thermoid's president Fred E. Schluter, at a regular safety meeting of all the plant's foremen. The new record nearly triples the plant's former safety mark.

Raymond H. Driesbach, of the Vulcanized Rubber Co., Morrisville, Pa., was chosen a member of common council of that borough.

(*Continued on page* 59)

OHIO

Interstate Welding Buys Plane to Speed Consulting Service

The Interstate Welding Service, Akron, according to President G. A. McLean, has purchased an Akron-made Funk "75" monoplane, which will be kept at the Akron Airport in instant readiness for use by Interstate experts who are called to distant points to quote on Banbury rebuilding work. This private airplane service will benefit rubber manufacturers throughout the country who may have difficulties with their mixers.

Established seven years ago, the Interstate Welding Service now is operating in Akron a fully equipped machine and welding plant for the complete and speedy rebuilding of Banbury mixers.

Firestone Sponsors Expedition

Dr. Wm. M. Mann, director, National Zoological Park of the Smithsonian Institution, Washington, D. C., sailed from New York on February 14 to lead a Smithsonian-Firestone expedition into the jungles of Liberia, West Africa, to collect wild animals. The expedition is sponsored by The Firestone Tire & Rubber Co., Akron, O., whose rubber plantations in Liberia comprise more than 75,000 acres under cultivation and employ about 15,000 natives.

Seiberling's Capital Readjustment Plan Completed

Sale of 28,000 shares of $2.50 convertible prior preference stock, totaling $1,281,000, to an underwriting group completed the capital readjustment plan of The Seiberling Rubber Co., Akron, according to President J. P. Seiberling. The proceeds of the sale will be used to retire all bank debts, remove all debt contingencies, and increase the company's working capital to $3,000,000.

This action will place the company in such a strong financial position that it will soon be able to declare and pay the dividends accumulated on the Class B prior preferred stock amounting to $75.38 per share and totaling approximately $105,000, stated Mr. Seiberling. Payment of these dividends will remove the final obstacle in the way of the resumption of dividends on the common stock; thus the company will be able to declare dividends on this stock as future earnings warrant.

This plan is the one introduced on April 13 and approved by the stockholders in a special meeting June 1, 1939.

At a directors meeting last month all officers of the company were reelected except that C. W. Seiberling was named first vice president and W. A. M. Vaughan vice president and treasurer. The executive committee of the board, consisting of J. P. Seiberling, Mr. Vaughan, and A. C. Blinn, was also reelected.

General Tire Elects

Stockholders of the General Tire & Rubber Co., Akron, held their annual meeting on February 6 at which the following directors were reelected: Wm. O'Neil, W. E. Fouse, Charles J. Jahant, Charles Herberich, G. F. Burkhardt, J. R. Kraus, and T. F. O'Neil, and Treasurer T. Spencer Shore was also named to fill a vacancy on the board. Then at the directors annual meeting the following officers were elected for 1940: president and general manager, Wm. O'Neil (reelected); vice president, Mr. Fouse (reelected); vice president and factory manager, Mr. Jahant (reelected); vice president and treasurer, Mr. Shore; vice president, in charge of sales, L. A. McQueen; vice president, in charge of retail merchandising, S. S. Poor; secretary, H. R. Jenkins (formerly assistant secretary); assistant treasurer, T. S. Clark (reelected); assistant secretary, F. W. Knowlton.

Annual Sales Conference

District managers and salesmen in seven of General Tire's fifteen sales districts last month held a three-day conference at the Hotel Mayflower in Akron. The conference, arranged by Mr. McQueen, included representatives from the Boston, Atlanta, Memphis, Detroit, Chicago, Kansas City, and Dallas districts. Mr. O'Neil, who opened and closed the affair, told the gathering that 1939 was the best year the company ever experienced. A visit of inspection was made to the principal plant of the company, and the various sessions were addressed by sales and production officials.

The James F. Lincoln Arc Welding Foundation, Cleveland, will made 458 separate awards, totaling $200,000, for papers on progress made by application of arc welding between January 1, 1940, and June 1, 1942. The first grand award will be $13,700. Full details of the award program will be found in a 48-page brochure just published by the foundation.

The Forest City Rubber Co., manufacturer of Cro * Pax Foot Aids and Sentinel First Aids, with offices and factory for many years at 1276 Ontario St., Cleveland, has been compelled because of rapidly growing requirements to move its factory to 216 St. Clair Ave., N.W., where new machinery and a conveyer system for economical handling and mass production were installed. The office will remain at the former location. President W. E. Crofut, who recently returned from a vacation down South, has reported that 1939 was by far the largest in volume and profits that the company ever experienced. The firm maintains branch factories at Toronto, Ont., Canada, and in Nottingham, England, a branch sales office at 15 E. 26th St., New York, N. Y., and distributers throughout the world.

New Company Formed

The Dunne Rubber Co., Ashtabula, recently organized with a capital of $50,000 to manufacture molded and extruded goods in both soft and hard rubber, has purchased from the Aetna Rubber Co., Ashtabula, one of its plants, formerly used for making rubber gloves, in which the most modern equipment has been installed, with production scheduled for early March. The property includes four acres of land and a single-story fireproof building with 22,000 square feet of floor space.

The officers of the new company are C. James Dunne, until 1929 manager of Aetna's Ashtabula plant and formerly manager of the hard rubber division of the Brunswick-Balke-Callender Co., Muskegon, Mich., plant, president and treasurer; C. J. Iten, vice president; and W. F. Krotzer, secretary and counsel. As these executives are not engaged actively in this new venture except in advisory capacities owing to the pressure of other businesses with which they are connected, they have appointed S. Hershberg as general manager. From 1916 to 1920 he was with the Republic Rubber Co., Youngstown, O., then went to Brunswick-Balke-Callender, and in March, 1922, joined Aetna, resigning on July 1, 1932, as comptroller and factory manager to help form the Advance Rubber Co., Akron, where he served as treasurer and general manager until its liquidation on December 31, 1937. Mr. Hershberg then was with the Richardson Co., Indianapolis, Ind., and in the latter part of 1938 was recalled by Aetna to become factory manager. He left several months ago to take up his present duties.

Goodyear Report to Employes

The Goodyear Tire & Rubber Co., Akron, in its annual report to employes by President Paul W. Litchfield announced it had in 1939, 45,686 employes, 1,400 more than in 1938, to whom it paid salaries and wages of $57,269,980, more than $6,000,000 above the 1938 figure, making Goodyear rubber workers among the country's highest industrial wage earners. Domestic taxes last year averaged $472 a worker. The company's income totaled $216,496,842, including $215,366,433 in receipts from customers, plus excise taxes and transportation charges, and $1,130,409 from income from other sources, as interest and rents.

Goodyear expenditures, besides salary and wages, follow: paid out for rubber, cotton, chemicals, other raw materials, transportation, advertising, other items, $116,070,452; reserve against wearing out of plants, machinery, $9,031,416; taxes and duties outside United States, $8,334,727; taxes, city, state, and federal, $13,600,759; interest on borrowed money used in business and as dividends on stock not owned by Goodyear in its foreign subsidiaries, $2,350,711.

Deduction of total paid out from total

Opening Night in One of the Two New Cafeterias Instituted This Year for the Convenience of the 250 Employes of National Rubber Machinery Co. Akron Plant

income left net profits of $9,838,797, out of which $5 were paid on each of 649,632 shares of outstanding preferred stock and $1 on each of 2,059,168 common shares outstanding.

Rubber Street Pavement Withstands 16-Year Service Test

When the 10- by 12-foot experimental section of rubber block paving, laid 16 years ago by Goodyear on busy East Market St. in front of its Akron factory, was recently inspected, it showed only slight wear. The rubber blocks used in this paving were eight inches long, four inches wide, and four inches high, with tongue and groove construction on their sides for secure joining. Tire tread stock was used on the top ¾-inch of wearing surface. The bricks were laid on an eight-inch concrete base with ¼-inch of asphalt between rubber and concrete. One end and one side of each brick was painted with an asphalt emulsion.

Goodrich Appointment

The B. F. Goodrich Co., Akron, through H. E. Keller, general manager of the Associated Tire Lines division, has announced the appointment of W. D. Lewis as operating manager of the division. Previously he had been assistant to C. E. Carroll, assistant general manager of the division.

Industrial Tire Sales Increase

According to statistics recently released by Goodrich, for the first half of 1939 the rubber industry's sales of industrial tires, pneumatics and solids, totaled 283,210 units, or 94.5% of the 1938 volume of 299,519 tires. Sales of industrial solids, 120,648 units for the six months' period were 76% of their 1938 total; while the sale of pneumatics for the period reached 162,562 units, 114% above the 1938 volume. More than 60% of the 283,210 industrial tires sold in the first half of 1939 was original equipment.

In the solid tire line the "cured-on-wheel" type constitutes the bulk of the business. For the six-month period 79,469 such installations were sold. The other conventional type, in which the tire is cured on the rim that is then pressed on the vehicle wheel, accounted for 41,179 of the industry's unit sales during the period.

Market analysts at Goodrich estimate that America's 210,000 factories and thousands of warehouses, terminals, and docks have 10,430,000 vehicles moving finished and unfinished goods, and each vehicle has two to six wheels; there are 10,000,000 floor and hand trucks, 180,000 hand-lift trucks, 200,000 industrial trailers, and 50,000 power trucks and trailers—and all used in operations which in most instances could be made more efficient if the vehicles rolled on rubber.

MIDWEST

U.S. Tire Dealers' Advisory Council Meets

Assuming his new position as general sales manager, U. S. Tire Sales Division, J. Chester Ray sounded the keynote for the 1940 advertising and sales promotion campaign before the U. S. Tire Dealers Corp. Dealer Advisory Council on January 29 and 30 at the Detroit plant of the United States Rubber Co. The meetings were addressed by other company officials who described business development, product changes and improvements, and advertising and sales promotion plans for the coming year.

The ten representative independent dealers from various sections of the country who handle U.S. tires and who make up the 1940 Dealer Advisory Council are: Sam Green, Master Auto Service Corp., Norfolk, Va.; Parry McClure, U. S. Tire Supply Co., Dallas, Tex.; Jack Gibbons, Cleaver & Gibbons, Inc., Pittsburgh, Pa.; Harold C. Heym, Heym & Kendall, Detroit, Mich.; C. A. Latcham, Latcham Bros. Tire Co., Denver, Colo.; Ned Miller, Eagle Tire Co., New York; Jack Abrams, City Ramp Garage, Spokane, Wash.; Jewett Davidson, Snow & Wheaton, Inc., Evansville, Ind.; L. D. Mosher, Mosher Tire Service, Hollywood, Calif.; and Wm. Wrightnour, Wrightnour Bros., Inc., Scranton, Pa., who was elected chairman of the council.

The next meeting will be held in late April or early May in Los Angeles, Calif.

Monsanto Chemical Co., St. Louis, Mo., according to Vice President Charles Belknap, last year spent about $4,200,000 for expansion and improvement of its manufacturing facilities and for this year anticipates expenditure of an even greater sum.

NEW ENGLAND

Pliofilm Package for Preserved Brain Specimens

A new technique for the preservation of brain specimens, which involves the use of Goodyear Tire & Rubber Co.'s Pliofilm, was recently developed by Dr. L. W. Darrah, of Northampton State Hospital, Northampton, Mass. Brain specimens, which are preserved in formalin or some similar solution, ordinarily require glass, stoneware, or other heavy containers. To simplify the task of carrying the brain specimens when on lecture trips, Dr. Darrah decided to make his containers of Pliofilm. The heat-sealing property of Pliofilm is utilized in making the envelope-like specimen containers.

Rhode Island during December, according to State Director of Labor Harvey Saul, employed the greatest number of wage earners in manufacturing plants in a decade. But the rubber industry, represented by eight concerns with 4,232 employes, was down 0.1% from the November figure, but 1.9% above that of December, 1938. Their payrolls totaled $337,732, 0.4% under November, but 15.8% above the December, 1938, figure. While electric power consumption in all manufacturing plants in the state averaged 15.7% kilowatt hours greater in December, 1939, than in the 1938 month, rubber concerns showed an increase of 16.5%.

Harry L. Fisher, of the research laboratory of U. S. Industrial Alcohol Co., 41 Magee Ave., Stamford, Conn., on January 30 addressed the Pennsylvania Chapter, American Institute of Chemists, in Philadelphia, on "Synthetic Rubbers."

Ernest W. Beck, safety director, United States Rubber Co., New York, N. Y., addressed more than 200 foremen of industrial plants at a recent safety council meeting at the Community Center, Manville, R. I. His subject was "Forty Thousand Reasons for Safety."

The General Insulated Wire Co., Providence, R. I., has filed a statement with the Secretary of State's office authorizing a change of capital stock from 1,000 shares of common without par value to total capitalization of $100,000 divided into 1,000 shares common at $100 each.

Film on Tire Building Released by Fisk

"Pattern for Industry," a film depicting the story of tire building, has been completed and released to all Fisk tire branches and will be shown at salesmen's and dealer's meetings and used for general promotion. The theme of the picture, which was prepared under the direction of C. Edgar Maynard, operations manager, is "New England Craftsmanship." Early settlers are pictured doing their farming and manufacturing by hand. The time is brought up to the present with a tour through the modern Fisk plant, showing all phases of a tire's construction. Thirty-three prints of the four-reel firm have been made.

CANADA

Canada's crude rubber imports during December totaled 6,775,497 pounds, against 3,482,017 in November and 4,924,258 in December, 1938, reports the Dominion Bureau of Statistics. The amount from the Straits Settlements in December was 5,416,831 pounds. Imports during 1939 aggregated 70,816,852 pounds, compared with 57,562,865 in 1938.

Dominion Rubber Co., Ltd., has moved its tire sales division from Montreal, P. Q., to Kitchener, Ont., to obtain closer cooperation among tire engineering, development, production, and sales departments. Paul M. Irwin, in charge of manufacturer's sales the past six years, was named sales manager of the tire division. H. J. Ross, formerly manager of the western division of the company, was appointed manager of the central division with headquarters in Toronto. Thirty-seven executives from all parts of Canada attended the annual tire sales meeting in Kitchener last month. Sessions were conducted under the chairmanship of A. W. Hopton, vice president in charge of dealer tire sales, assisted by Mr. Irwin. J. A. Martin, vice president in charge of manufacturing, took an active part and arranged, under the auspices of R. Y. Copland, factory manager, a trip through the Kitchener tire plant.

The B. F. Goodrich Rubber Co., of Canada, Ltd., Kitchener, Ont., according to a recent announcement of the Defense Purchasing Board, was awarded a contract for $17,768 for airplane deicing equipment.

Charles E. Mills, who sailed from New York on February 23 to take up his duties as Goodrich technical representative with FUNSA in Montevideo, Uruguay, spent several weeks studying footwear manufacture at the Kitchener plant.

Ten veterans in the service of the Goodrich company recently organized a Twenty-Year Club. Ettie Keffer, of the Toronto office, and oldest Canadian employee in point of service with 22 years, was named honorary president; Clarence A. Leicht, assistant factory manager, was elected president, and Cora Schierholtz, also of the Kitchener plant, was elected secretary. G. W. Sawin, vice president and general manager, with Goodrich more than 27 years, was toastmaster at the organization dinner. Other members of the club are Howard P. Hawkins, mechanical goods sales manager; Ira G. Needles, tire sales manager; T. H. Ainlay, purchasing agent; I. H. Wahrer, office manager; W. H. Koehler, and R. A. Gunther. The ten members have a total of 225 years of service to their credit.

War Supply Board, Ottawa, Ont., in its recent list of contracts awarded included two for rubber clothing and accessories: Kaufman Rubber Co., Kitchener, Ont., $51,750, and Northern Rubber Co., Ltd., Guelph, Ont., $7,800.

Seiberling Rubber Co. of Canada, Ltd., Toronto, held its annual stockholders' meeting on January 27 at which the following directors were elected: F. A. Seiberling, R. J. Thomas, M. L. Brown, J. A. Thompson, and C. E. Jones. A by-law was passed authorizing the appointment of a permanent chairman of the board, and at a subsequent meeting of the directorate the following officers were elected: Mr. Seiberling, chairman; Mr. Thomas, president and general manager; Mr. Jones, vice president; Mr. Brown, vice president in charge of production; and H. W. Gregory, vice president in charge of sales. Mr. Thomas presided and outlined the activities of the company since the taking over of the present plant in 1927; it has shown steady growth during the past few years.

EASTERN

(Continued from page 56)

The United States Labor Department, Washington, D. C., in its recent lists of government supply contracts awarded includes the following: Navy: *cable:* Crescent Insulated Wire & Cable Co., Trenton, N. J., $10,074; *shoes (gym):* United States Rubber Co., Naugatuck, Conn., $22,500; *titanium barium:* Titanium Pigment Corp., New York, N. Y., $57,812; *webbing (linen):* Buffalo Weaving & Belting Co., Buffalo, N. Y., $53,240; *zinc:* New Jersey Zinc Sales Co., New York, $10,828; Procurement: *cushions (replacement):* Sponge Rubber Products Co., Derby, Conn., indefinite amount; War: *cable and reels:* General Cable Corp., New York, $160,738, John A. Roebling's Sons Co., New York, $44,491; Panama Canal: *cable:* Roebling's Sons, $11,319.

Rubber Trade Association for Limiting Rubber Reexports

Rubber Trade Association of New York, Inc., 95 Broad St., New York, N. Y., held a special meeting on February 15 at which its members unanimously adopted the following resolutions:

"Resolved: That the Rubber Trade Association of New York, Inc., and its members, are heartily in accord with the policy of the United States Government in endeavoring to restrict reexports of rubber to normal peace time exports by voluntary cooperation of members of the industry, and hereby expresses the consensus of opinion of its members that every effort be made to support the Government's policy in this respect.

"Further Resolved: That the Board of Directors of the Association be and it hereby is authorized to appoint a special committee to devise ways and means of securing compliance with such policy by all members of the Association, such committee to have authority to confer in Washington with Government authorities in connection with its duties, and to report back to the membership with its recommendations."

Jos. Stokes Rubber Co., Trenton, N. J., is installing new hydraulic equipment, costing more than $20,000, in a small two-story brick building recently erected. Stokes business declined last month.

Essex Rubber Co., Trenton, N. J., recently held a general sales conference at its factory and at the Stacy Trent Hotel, attended by salesmen from all over the country. J. R. Hewitt was in charge.

Horace T. Cook, president of the Hamilton Rubber Mfg. Co. and Acme Rubber Mfg. Co., both of Trenton, N. J., is vacationing at Lake Wales, Fla.

Crescent Insulated Wire & Cable Co., Trenton, N. J., although only recently operating with three shifts, has laid off a number of employes because of the present dull season.

FROM OUR COLUMNS

50 Years Ago—March, 1890

A pneumatic tire for bicycles, which promises to make a new era in bicycling, is reported from Belfast, Ireland. The tire for a full roadster is about 2½ inches in diameter, and is composed of an outer covering of rubber where it touches the ground, and protected by canvas where it is attached to the rim. (p. 122)

Every factory in the United States should have a small grinder for ounce batches, a miniature vulcanizer, and the right man to try the thousand and one experiments that are suggested in the every-day work of the factory. (p. 129)

The Gossamer Manufacturers' Association lately held a meeting at the rooms of the Merchants' Association in Boston, and voted to change their name to the Rubber Manufacturers Association. (p. 137)

Mr. H. E. Converse, during a recent visit to Paris, found himself one rainy day without a pair of rubbers. Calling the *garçon* he despatched him for the best pair that could be purchased. The messenger returned with a nice looking pair of rubbers, remarking that he had secured the best brand to be found in France. Mr. Converse turned them over to look for the maker's name when he read [his own firm's name]: "Boston Rubber Shoe Company." (p. 138)

The Boston Rubber Shoe Co. have just adopted the micrometer dial gauge manufactured by Mr. Webster Norris, of Malden. (p. 138)

India rubber has been successfully used for street pavements in the town of Linden in Hanover as the result of experiments by Herr Busse, a German engineer. In London, also, rubber has been laid down on the approaches to Euston railway station. (p. 140)

25 Years Ago—March, 1915

An official of a Los Angeles street railway company recently stated to a committee of the California legislature that it would only be a short time before the auto-bus would drive the trolley car out of business. (p. 313)

Recent proposals have been made to vulcanize with selenium and tellurium. (p. 324)

The fraction of Baku petroleum boiling between 98 and 106° C. yields about 20% of adipic acid which, through its amide, may be converted into butadiene, though the process is said to be scarcely commercial as yet. (p. 324)

It may be interesting to readers to know that there are 20 rubber factories in Trenton. (p. 344)

Contrary to expectations, the rubber producing industry has suffered least of any through the European conflict. The commodity has continued in good demand and prices have been well maintained. (p. 351)

Chiksan Buys Larger Factory

Chiksan Tool Co., formerly at Fullerton, Calif., has moved to Brea, Calif., where its property, purchased from the Shell Oil Co., includes a modern office building, facilities for housing the Chiksan factory, testing department, and stock warehouse. Machinery and equipment are being moved to the new location from the former plant as rapidly as production schedules permit.

Owing to constantly increasing demand for Chiksan products, including ball-bearing swing joints and all-steel rotary hose, both in the United States and foreign countries, Sales Manager Earle R. Atkins reports sales for 1939 were the largest in the company's history, with 1940 already offering indications of exceeding 1939 by a substantial margin.

New Plant of Chiksan Tool Co. at Brea, Calif.

OBITUARY

Fred V. Stroming

HEART disease caused the death, on January 24, at his home in Passaic, N. J., of Fred V. Stroming, president of the Goodyear Sundries & Mechanical Co., Inc., 85 Chambers St., New York, N. Y., which he had organized in 1927. His career in the rubber industry began in 1916 when he joined the Manhattan Rubber Mfg. Co., Passaic. Then from 1921 to 1927 Mr. Stroming was manager of the mechanical goods and the sundries and clothing departments of the Goodyear Rubber Co., Middletown, Conn.

The deceased was born in Punxsutawney, Pa., January 3, 1891. He attended Rockaway High School and Long Island College, graduating in 1909. The next year he became a purchasing clerk for the Lackawanna Railroad.

He leaves his wife and two sons.

Funeral services were held on January 26 in Clifton, N. J.

Charles A. Blake

INJURIES resulting from a fall led to the death on January 7 of Charles Alexander Blake, for the past nine years president and general manager of The Elm City Rubber Co., New Haven, Conn. Previously he had been connected with the United States Rubber Co. for about 28 years in executive capacities.

Mr. Blake was born on July 7, 1881, and attended Pratt Institute, Brooklyn, N. Y. He belonged to the Masons and the New Haven Elks.

Survivors include his wife, a son, a daughter and two brothers.

Funeral services were held in New York on January 9. Interment was in Greenfield Cemetery, Hempstead, L. I.

Robert Berkowitz

FOLLOWING a short illness Robert Berkowitz, chief chemist of the Metal Hose & Tubing Co., 253 Tillary St., Brooklyn, N. Y., which he had joined in 1916 after his graduation from Pennsylvania State College with a B.S. degree, died on January 27. Mr. Berkowitz, who was born in Wilkes-Barre, Pa., on July 5, 1893, belonged to Beta Sigma Rho, the Masons, American Society for Testing Materials, the American Chemical Society, and the executive committee of the New York Group. His hobbies were bridge and carpentry.

He is survived by his wife, two sons, three sisters, and two brothers.

The funeral was held from New York on January 29, with interment in Brooklyn.

Robert P. Hayden

ROBERT P. HAYDEN, retired executive of Johnson & Johnson, New Brunswick, N. J., died on January 28 at Baltimore, Md. Born in Marydel, Md., 64 years ago and educated at the University of Maryland, he worked several years as a pharmacist before joining Johnson & Johnson on January 1, 1923, as head of the planning and promotional department. He subsequently became an assistant vice president (1931), and vice president in charge of manufacturing operations, foreign and domestic (1932). He retired November 1, 1939. Mr. Hayden was also a director of St. Peter's Hospital, New Brunswick.

He is survived by his wife and a brother.

Funeral services were held at the Hayden home in Highland Park, N. J., on January 31. Burial was in Riverview Cemetery, Wilmington, Del.

EUROPE

GREAT BRITAIN

Chlorinated Rubber and Jute

The ease with which chlorinated rubber can be incorporated in high aromatic tars and the favorable effect on elasticity, tendency to bleed, and the resultant rate of drying were first mentioned in the September, 1936, *Bulletin of the Rubber Growers' Association.* In a more recent issue David D. Pratt and Roy Handley[1] report on further work at the Chemical Research Laboratory, Teddington, of the Department of Scientific and Industrial Research, under the supervision of G. Stafford Whitby and on behalf of the British Rubber Producers' Research Association.

It was found that jute materials can be satisfactorily impregnated with chlorinated rubber and tar blends to protect the fibers from rot and decomposition caused by moisture, if aqueous emulsions of the chlorinated rubber/tar blends are used. Such emulsions were readily prepared by dispersing 3 to 5% of a suitable emulsifier in the blends (1 to 3% Alloprene C in tar of low viscosity—10 seconds), at about 50° C., adding the warm material to an equal volume of warm alkaline solution (0.5% sodium hydroxide) and agitating briskly. Similar emulsions were also used to coat jute thread, and flexible, non-staining yarr of good tensile strength was obtained.

Woven jute soles were improved as to flexibility, strength, and resistance to water penetration by dipping in chlorinated rubber/tar blends at 80 to 90° C. From 1 to 5% of Alloprene C. was used in the blends; the favorable effects were greater with increasing chlorinated rubber content. Besides satisfactory laminated holdings were made by using jute fabrics heavily coated with chlorinated rubber/tar as bonding and reenforcing agents in multi-layer cardboard or paper boards.

Injection Molding of Rubber Powder

After considerable experimentation F. H. Cotton and W. F. Hodson[2] have succeeded in developing a method of mixing and molding rubber without mastication, and consequent elimination of heavy milling machinery. This has been accomplished by adapting the injection method of molding, followed in some sections of the plastics industry, to the special requirements of rubber powder.

The authors used the rubber powder made by the Stam process and supplied by the Rubber-Latex-Poeder Cie. of Holland. This powder, which was free running and showed no tendency to agglomerate, is believed to have been made from latex to which had been added an ammoniacal solution of zinc phosphate which, reacting with the serum constituents of the latex, forms a non-adhesive layer around the rubber particles.

At first it was attempted to mold the powder, thoroughly mixed with suitable compounding ingredients by passing through a ball mill, in a plunger mold; but although various softeners were added, and the mix was subjected to vulcanization for 30 minutes at 186° C. under hydraulic pressure of 10 tons per square inch, homogeneous vulcanized rubbers of satisfactory physical strength could not be obtained.

However it was observed that the spew forced up under great pressure between the plunger and the internal face of the mold cavity was coherent and remarkably strong and elastic. Evidently the internal friction caused by forcing the powdered rubber between the opposing faces of the plunger and the mold cavity had mechanically ruptured the protective skin around each rubber particle, thus effecting that necessary cohesion unobtainable by other means. This result immediately led to the idea that if rubber mixes were forced into the mold under great pressure through a small hole, following the process used in the plastics industry for so-called injection molding, the shearing effect produced during passage through the opening would cause the rubber particles to burst and to cohere. Preliminary experiments along these lines were first conducted in a plastics factory, and the encouraging results led to the devising of an experimental apparatus better suited to working rubber powder. Even at this early stage, while device and technique have yet to be perfected, the authors feel that results justify the conclusion that the injection method of molding rubber articles has great possibilities for the industry.

I. R. I. Meetings

The London Section of the Institution of the Rubber Industry on January 8 viewed the following films: "From Tree to Factory," demonstrating tapping, collecting latex, transportation, preparing latex for dipped goods; "De-Icers for Aircraft," "Making a Swan Pen," "Cornish Pyramids," showing the manufacture of China clay, and "The Material of Infinite Uses," the manufacture of Bakelite.

The latest program of the Institution of the Rubber Industry included the following meetings and lectures:

February 2. Leicester. Joint meeting with the Leicester Textile Society. Paper on "Application of Rubber to Textiles" by Dr. C. M. Blow.

February 12. London. "What Is Costing and Its Relation to Price Fixing?" by D. Cairns.

February 19. Manchester. Joint meeting with the Society of Chemical Industry. "Plastics for Electrical Insulation," M. Massey.

March 11. London. "Cable Insulating Mixings Containing Unvulcanized Rubber," J. N. Dean.

Notes

The ruling passed a few years ago to enforce the use of pneumatic tires on all motor vehicles granted those running on non-pneumatic tires before January 1, 1933, exemption until January 1, 1940. The exigencies of the present have caused the Minister of Transport to extend the period for another year. At the same time pneumatic tired steam-tractors with similarly equipped trailers are allowed a two-ton increase in their maximum laden weight, bringing the permitted total to 24 tons.

For the eighth successive year the British Tire & Rubber Co., Ltd., showed an increase in profits. In the business year just ended, profits totaled £267,211, against £228,858 in the preceding year; net profit, subject to tax, £217,933, against £177,112. A final dividend of 4½% was paid, bringing the ordinary dividend to the same level as for each of the past five years. A bonus of 3% and an additional bonus of 1% to cover the increased rate of income tax were also recommended.

The company's subsidiaries also showed profits for the year under review. The India Rubber Gutta Percha & Telegraph Works Co., Silvertown, acquired about six years ago, was said to have reached the turning point in 1938, for which year profit of £32,608 was reported, increased to £60,485 for the past year, the result of the first year's working in the reconstructed and modernized works.

GERMANY

Synthetics for Printing Rolls

Perbunan and Perduren, which have been found to give such excellent service in various technical applications, are now also recommended for the production of printing rolls and blacks.[1] Recent experiments have shown that rolls made from Perbunan have excellent resistance to aliphatic carbohydrates in addition to elasticity and mechanical properties equal to those of natural rubber. For special purposes, where softness and extensibility are required in additon to mechanical strength, a new material has been developed consisting of a combination of Perbunan and glycerine-gelatine paste. The Perbunan rolls are used chiefly for high relief and flat printing; Perduren rolls, more resistant to swelling than those of

[1] "Application of Chlorinated Rubber-Tar Products to Jute Fabrics." Nov.-Dec., 1939, pp. 521-26.

[2] "Mixing and Molding without Mastication." *Rubber Age (London)*, Jan., 1940, pp. 317-21.

[1] *Rdsch. Dtsch. Techn.*, 19, 31, 4 (1939).

Perbunan, although the mechanical properties are slightly inferior, are preferred for photogravure and off-set printing. Pure Perbunan is used for blocks.

Carbon Black Sales to Belgium

Reports from another source state that attempts are being made to push the sale of German produced carbon black in Belgium and to oust the American product. Belgian manufacturers are informed that the German blacks are being successfully used by most German manufacturers and that they can count on speedier delivery and freedom from shipping difficulties when ordering blacks from Germany. They are further assured that the price would be the same as the "world price" for American carbon black.

Notes

The course on rubber technology at the Technical Institute of Berlin was resumed January 15, 1940. The lectures, to comprise selected chapters on the entire subject, begin with an introduction to the production of synthetics (condensation and polymerization resins) and their use in rubber and Buna compounds.

The Pahlsche Gummi-und-Asbest Gesellschaft, Dusseldorf-Rath, has changed its name to Pahlsche Gummi-und-Asbest Gesellschaft "Paguag."

The Deutsche Gold-und-Silber-Scheidesanstalt, vorm. Roessler, Frankfurt a.M., the third most important chemical and metallurgical concern in Germany, declared a 9% dividend for the business year 1938-1939. The carbon black department recently was reorganized, and apparently no difficulty has been experienced in meeting the increased demand both at home and abroad. At the same time efforts to develop special qualities of carbon black to take the place of imports are said to be successful.

EUROPEAN NOTES

Government Restrictions

Exports of rubber and/or rubber goods are now also subject to control in Portugal, Sweden, Switzerland, and Yugoslavia.

The Bulgarian government has placed the entire rubber industry under control so that merchants now must obtain special permits before they can sell crude rubber to manufacturers; entries of raw rubber must be reported to the government by the customs offices; manufacturers are not free to manufacture goods as they please. They may still produce children's and ladies' galoshes; peasants' shoes, sandals, soles, and heels; tires for automobiles, motorcycles, bicycles, and carriages; pedals, brakes for bicycles; rubber hose; jar rings; rings and valves for plant sprayers; all kinds of technical rubber goods and articles for industry. They may also retread automobile tires. But the manufacture of all other articles is forbidden.

Norway

Imports of automobile tires into Norway for the first nine months of 1939 totaled 541,314 kilos, against 471,828 kilos in 1938 and 581,9?8 kilos in 1937. The United States, which supplies about half the total imports, and France, Germany, and Italy were the chief suppliers. The United States shipped more in the nine months of 1939 than in all of 1938, but the percentage of the total of American business here decreased from 51.5 to 48.6.

Hungary

Because of the rise in the cost of raw materials the Hungarian government has permitted increases in the prices of rubber goods ranging from 10 to 25% of the basic prices fixed on August 26, 1939.

Netherlands

The Rubber Foundation has been working on reducing the cost of the Kaysam process. This has hitherto often proved too expensive because it has been practically impossible to add fillers to the latex in the desirable quantity without causing premature coagulation. According to *Rubber*, the organ of the Rubber Foundation, G. van Nederveen, of the research section of the foundation has succeeded in overcoming the difficulty, having found suitable special stabilizers to be added to the latex. With the help of these stabilizers up to 240% by weight of chalk (equals 90% by volume) has been successfully incorporated in a Kaysam mix. Even with a chalk content of 20% by volume, the stabilizers must be added; a mixture of sodium oleate and Igepon T has proved satisfactory.

A detailed report on this discovery will soon appear in a communication of the foundation.

Transpama is the name under which a line of goods as, waterproof garments, umbrellas, covers, and cases for various purposes, made from the appropriate type of Pliofilm, is marketed in the Netherlands. Van Rossem & Co., the Hague, the Netherlands agents of the Goodyear Tire & Rubber Co., Akron, O., U. S. A., acquired sole rights for the manufacture of these articles in Holland and has opened a special new Transpama section.

France

The Institut Français du Caoutchouc, the French rubber research society formed in connection with the International Rubber Research plan, has moved to 42 Rue Scheffer, Paris.

FAR EAST

MALAYA

Planting without Burning

Rubber planting methods have undergone many changes in the last decade or two, but one custom not abandoned is burning jungle on land. In the *Planter's Bulletin*, September 1, 1939, issued by the Rubber Research Institute of Malaya, the advantages and some of the disadvantages of planting without burning are discussed.

By omitting the burn the top soil and particularly the humus are conserved; the surface soil is kept microbiologically "alive" instead of being temporarily sterilized by fire; more of the plant foods stored in the jungle plants are saved; natural covers get a good start, etc. The disadvantages have still to be studied thoroughly, but none appears to be overwhelmingly serious. A few are enumerated: increased damage from animal pests, especially rats; danger of fire in dry weather until the felled jungle has rotted sufficiently, and at first greater difficulty in supervising labor and also in controlling root disease. The article also discusses the various possible methods that could be followed in planting without burning.

At the Experimental Station of the Institute a test was begun in 1935 on 40 acres of jungle land in which the no-burn method seems to have been combined with the best features of the orthodox system. The growth of the trees, which were budded, is reported very satisfactory so far, and costs have been no higher than in the usual methods.

Recently several estates have shown an interest in this method, and it is estimated that many thousands of acres in various parts of the country will be planted in unburned jungle before the end of 1940. Judging by costs and results obtained to date, it is concluded that this method deserves to become standard.

Serum as Coagulant

Like other rubber-growing countries in the Far East, Malaya is suffering from a shortage of coagulants, formerly largely supplied by Holland and Germany. It is expected that normal supplies will become available before long, but to conserve the present supply of acid the Chemical Division of the Rubber Research Institute of Malaya has recommended the temporary use of serum for coagulating purposes.

The serum remaining after acid coagulation is sufficiently acid to coagulate a second quantity of latex, but it cannot be used indefinitely as the acidity is reduced by repeated dilutions and by the removal of a portion of the ser-

um with each succeeding coagulum. Furthermore, the acidity of the serum is not stable, falling sharply after two days and rising steeply a few days later as a result of fermentation. There is a greater tendency for bubbles to form when serum is used than in normal acid coagulation; this tendency increases along with the age of the serum.

For this and other reasons the use of serum alone is not advised. But it has been found that if a portion of the serum is supplemented with fresh acid so that half the acidity is derived from the serum and half from the acid, the coagulant may be used repeatedly. The procedure suggested is to coagulate the first batch of latex in the usual way; thus 200 gallons of latex are diluted to 1½ pounds dry rubber content per gallon, and 15 fluid ounces of formic acid and 10 gallons of water (for acid dilution) are added. For subsequent coagulations 130 gallons of latex are diluted to 2¼ lbs. dry rubber content, mixed with 65 gallons of serum from the previous coagulation, 7½ ounces of formic acid, and 5 gallons of water (for acid dilution). On days when tapping is not possible, it is advised to discard the serum and make a fresh start with only acid as the coagulant.

In this way a saving of nearly 50% of acid consumption can be made. First quality sheets, as judged by market standards, have been prepared by this method, and tests are being carried out to examine the vulcanization and other properties of the rubber.

The institute has also issued a circular printed in various languages suggesting that fermented coconut water should be used for coagulating instead of acetic or formic acid.

AUSTRALIA

The rubber industry of Australia has developed considerably from 1913 to 1938. At the end of 1913 the existing rubber factories produced goods valued at £266,000 (Australian); for the year ended June 30, 1938, the figure was £2,462,000. Data about the manufacture of tires in 1913 are not available, but in 1937-38 this branch of the local rubber industry employed 5,847 persons and produced goods valued at £2,013,000.

The government plans to encourage various new undertakings, including the production of rubber insulated cables for electrical purposes and cotton fabric for automobile tires.

Regulations to restrict the importation of a wide range of products became effective December 1, 1939. Among the goods which may not be imported if they are not produced by sterling countries are various articles of rubber.

NETHERLAND INDIA

Firms Making Rubber Goods

The report on industries in Netherland India, recently issued by the Commercial Museum Section of the Royal Society "Colonial Institute," contains much information on the various firms manufacturing or employing rubber in one way or another. Paint factories include P. A. Regnault's Verf-Inkt-en Blik-fabrieken, of Soerabaia and Batavia, and Van Lindeteves-Pieter Schoen, of Batavia, the latter a new branch of Pieter Schoen, of Zaandam, Netherlands, which manufactures chlorinated rubber paints besides other products. The first-named concern uses rubber for sealing its paint tins which it also makes.

Of the few rubber factories established in Java in 1917, the Rubberfabriek Ngagel, Soerabaia, alone survives. Started as a small factory, it developed into an enterprising business employing about 300 persons. The products include rubber floor coverings, diving suits with the necessary hose, conveyer belts, hose and packings of various kinds. The company has a capacity of 9,000 gas masks for civilians and 7,000 service masks a month, and it is planned to increase output.

Fateru, Fabriek voor Technische Rubberwaren, Bandoeng, with 230 employes, also makes gas masks. At the end of 1938 the Singapore Rubber Works was established at Bandoeng to manufacture gas masks. It has a productive capacity of 1,000 masks a day. Eventually, however, other rubber goods will be made.

The rubber-working section of the Bataviaasche Arbeids-Centrale, begun in 1936 as a sociological undertaking, now has become of commercial importance. The chief products are latex gloves and nipples.

The government is especially interested in encouraging the use of pneumatic tires for heavy wooden ox-carts, which usually have iron-shod wheels causing great damage to roads. In many districts the tax on ox-carts equipped with pneumatic tires is lower than for those with iron-tired wheels and various municipalities are placing rubber tires on carts in sanitation departments.

The Goodyear Factory

The most important rubber enterprise in Netherland India is the factory of the Goodyear Tire & Rubber Co. at Buitenzorg. Opened in June, 1935, it originally had a daily capacity of 300 automobile tires and a somewhat larger number of tubes. The manufacture of cycle tires and tubes was started in 1936 when the daily output, working in three shifts, was 2,000 tires and as many tubes. The company obtains part of its raw rubber from the East Coast of Sumatra where it has two plantations, Dolok Merangir, with an area of over 6,000 hectares, and Wingfoot, with an area of over 20,000 hectares, most of which is in production.

By the end of 1937 the daily output was 600 automobile tires, 600 tubes, 7,000 cycle tires, and 7,000 cycle tubes. In addition the manufacture of solid and pneumatic tires for other types of vehicles was begun.

Recognizing the importance of the Goodyear enterprise for Netherland India, the local government has guaranteed the company an annual sale of 90,000 tires and to this end has fixed import quotas for automobile tires and tubes. In December, 1935, the quota for tires was 1,262 tons, or 100,000 units, and for tubes, 60 tons. When local tire consumption increased, these quotas were raised and for 1939/40 have been fixed at 170,000 tires, or 2,139 tons, and 232 tons of tubes.

The export quota of the Goodyear factory has been fixed at 2,000 tons, or about 150,000 tires. Although exports have been increasing from year to year and were 359 tons for the first half of 1939, against 481.5 tons for all of 1938, they are still a long way from the quota.

Crude Rubber Exports

The Central Bureau of Statistics reports 30,839,531 kilos of crude rubber, exported in November, 1939, as follows: Java and Madura estates, 5,950,674 kilos; estates in the Outer Provinces, 9,806,886 kilos, including 953,492 kilos latex; and native producers in the Outer Provinces, 15,081,971 kilos.

Dangerous Coagulant

As the war has caused a shortage of formic acid, the most widely used coagulant in the Far East, other coagulants are being sought. Native producers are increasingly going back to alum. As it is well-known that this substance has a deleterious effect on rubber and as the danger of fires in the smoke-house is increased by alum-treated rubber, the government has issued a warning, especially intended for natives, against the excessive use of alum.

INDO-CHINA

Some time ago creation of a Rubber Research Institute for Indo-China was discussed locally, and now the governor-general of Indo-China has informed the president of the Indo-China Rubber Planters Association that he considers the time has come to establish such an institute and 10,000,000

(*Continued on page* 74)

Editor's Book Table

NEW PUBLICATIONS

"Our Most Versatile Vegetable Product." J. R. Hildebrand. The February issue of *The National Geographic Magazine* presents as its lead article this interesting 57-page story on the production and uses of rubber. The article and the illustrations, many of them in color, stress the multitudinous applications of rubber. Writing for the layman, the author explains the properties of rubber, manufacturing processes, and statistics in an easily understood language.

"Bristol's Air-Operated Free-Vane Controllers for Temperature, Flow, Liquid Level, Pressure, Draft, Humidity, and pH Value." The Bristol Co., Waterbury, Conn. 32 pages. The basic principles underlying the operation of the Free-Vane system of control, as applied to a wide range of the firm's industrial control instruments, is explained in this booklet. Also included is a discussion of coordinated process control for maintaining precision operation of all the variables in a complete process.

"Something of the What, Why and Where of Unemployment." No. 34 in a series of booklet editorials by Allen W. Rucker in collaboration with N. W. Pickering, president, Farrel-Birmingham Co., Inc., Ansonia, Conn. 20 pages. The conclusion reached by the authors of this booklet is that the decrease in the number of going concerns since 1929 explains the cause of a substantial part of the increase in unemployment since that year. Figures are quoted from the U. S. Census of Manufactures to show that four shifts in job opportunity have occurred: (1) from the durable and heavy goods industries to the consumable and light goods industries; (2) from the largest and smallest sized concerns to medium sized concerns; (3) from the New England and Atlantic Seaboard states to the Midwest, South, and Pacific Coast; and (4) from the largest and smallest of the great industrial areas to either the medium sized cities or to the smaller cities and towns outside the principal industrial areas. The authors hold that much of the basic cause of the unemployment problem can be removed by cessation of efforts to protect an arbitrary wage rate structure.

"The RMA Manual of Retreading and Recapping." The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y. 24 pages. Price 10¢. This comprehensive manual, prepared as an aid to the tire repairman, covers methods of retreading and recapping, recommended by the Tire Accessories and Repair Materials Committee of the R. M. A. After defining retreading, recapping, and top-capping, this manual discusses the various steps in retreading: inspection, preparation, selecting the proper die size, building up, curing, and final finish. The standardization program on camelback and capping stock is also dealt with in this booklet.

Originally the association's "Manual of Tire Repairing" also contained information on retreading. Because of the growth of the field, however, separate publication was deemed desirable. A revised issue of "Manual of Tire Repairing," the text of which will be confined to sectional repairing, is expected to be issued soon.

"Schrader Dealer Catalog." A. Schrader's Son, Division of Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn, N. Y. 32 pages. This catalog covers the complete line of the firm's tire service accessories, including: tire valves, valve parts, and service tools; pressure gages; air chucks; airline couplers; blow guns and nozzles, spark plug tire pumps; and tube vulcanizers. Helpful service data, illustrations, and charts are included.

BOOK REVIEW

"Rubber and Railways." Second Edition. Colin Macbeth. Issued by the British Rubber Publicity Association, 19 Fenchurch St., London, E.C.3., England. 1939. Paper, 5½ by 8⅜ inches, 216 pages. Illustrated. Copies obtainable free of charge.

The first edition of this book, which appeared in 1931, contained only 61 pages. This second edition, extensively revised and amplified, deals with the utilization of rubber by the railways of Great Britain, France, and America. Considerable space is devoted to rubber buffing and draw-bar springs which, according to the author, utilize about one-third of the total amount of rubber used on railways. Other chapters deal with auxiliary bearing springs, bogie bolster mountings, hose and allied parts, and miscellaneous locomotive parts. A section on rubber in coachwork discusses vestibule diaphragms, draught prevention, seat cushioning and mattresses, upholstery fabrics, and flooring. The application of pneumatic tires to railway wheels, as exemplified by the Michelin Rail-Car, and the unique utilization of rubber at various important points on the Bugatti High Speed rail vehicles are also treated in detail. Rubber usage is rapidly increasing in this field, and this book, based on authoritative information, should be of interest to all those connected with this work.

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MACHINE FOR RECOVERING RUBBER FROM LOW-CONTENT PLANTS. *Rubber Age (N. Y.)*, Feb., 1940, p. 299.

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THE TESTING OF RUBBER AT LOW TEMPERATURES. J. H. Carrington, *India Rubber J.*, Jan. 20, 1940, pp. 4-6.

WOUND HEALING AND BARK RENEWAL IN HEVEA BRAZILIENSIS. H. Ashplant, *India Rubber J.*, Jan. 20, 1940, pp. 11-13.

WORKING UP "THIOKOL." O. Kolbl, *Gummi-Ztg.*, Nov. 17, 1939, pp. 1134-35. (Conclusion.)

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Patents and Trade Marks

MACHINERY*

United States

2,188,076. **Extrusion Press.** R. W. Dinzl, Westfield, assignor to the Watson-Stillman Co., Roselle, both in N. J.
2,188,456. **Saw Apparatus for Grooving Rubber Rolls.** H. Galber, assignor to I. F. Laucks, Inc., both of Seattle, Wash.
2,188,625. **Heater for Liquid Latex.** R. A. Dufour, Paris, and H. A. Leduc, Mantes-Gassicourt, both in France.
2,189,203. **Tire Buffer.** E. A. Glynn, assignor to Super Mold Corp. of California, both of Lodi, Calif.
2,189,492. **Compensator for Feeding Elastic Thread.** A. H. Henne, Millbury, assignor to Worcester Knitting Co., both of Worcester, Mass.
2,189,966. **Elastic Band Form.** A. N. Spânel, Rochester, N. Y.
2,190,266. **Continuous Vulcanizer.** W. W. Knight, assignor to Roth Rubber Co., both of Cicero, Ill.
2,190,597. **Elastic Thread Measuring Device.** L. Dritz, assignor to Dritz-Traum Co., Inc., both of New York, N. Y.

Germany

685,693. **Device and Method to Make Rubber Thread.** Kolnische Gummifaden-Fabrik vormals Ferd. Kohlstadt & Co., Kohn-Deutz.
686,055. **Device for Tensionless Feeding of Rubber Thread on Knitting Machines.** Firma Karl Lieberknecht, Oberlungwitz, Saxony.

PROCESS

United States

2,188,342. **Mats.** W. E. England, assignor to Ohio Rubber Co., both of Willoughby, O.
2,188,434. **Bonding Rubber to Metal,** using 200 to 30-Mesh Sulphur at the Interface. H. W. Grinter, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,190,202. **Inner Tubes.** G. C. Arey, Fort Thomas, Ky.
2,190,265. **Spinning Artificial Threads** from Polyvinyl Compounds. E. Hubert and H. Hecht, both of Dessau in Anhalt, and H. Pabst, Dormagen, assignors to I. G. Farbenindustrie A.G., Frankfurt a.M., all in Germany.

Dominion of Canada

386,674. **Forming an Abrasive Sleeve.** D. E. Mulholland, Reading, Pa., U. S. A.
386,722. **Elastic Ply Fabric.** (Latex.) International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of T. G. Hawley, Jr., Naugatuck, Conn., U. S. A.

Germany

684,152. **Moisture-Proof Tennis Ball Cover.** Hessiche-Gummiwarenfabrik Fritz-Peter A.G., Klein-Auheim, Main.
685,791. **Cable Sleeves.** (Synthetic.) Allgemeine Elektricitats-Gesellschaft, Berlin.
686,154. **Improving Rubber Insulations.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands. Represented by C. and E. Wiegand, both of Berlin.

CHEMICAL

United States

2,187,817. **Interpolymerization Products** of Vinyl Chloride and Esters of Maleic Acid. H. Hopff and G. Steinbrunn, both of Ludwigshafen a.R., and H. Freudenberger, assignors to I. G. Farbenindustrie A.G., both of Frankfurt a.M., all in Germany.
2,188,280. **Accelerator**—Ethyl Carboxy Methyl Di (Diethyl Dithiocarbamate). J. G. Lichty, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.
2,188,283. **Casein Adhesive** for Bonding Artificial Silk to Rubber. F. H. Manchester, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,188,327. **Latex Composition** containing a Rubber Solvent, a Plasticizer (Hydrogenated Phenol), and a Wetting Agent. C. M. Albion, Newton, Mass.
2,188,396. **Molding Paste** Comprising Polyvinyl Chloride and Solvent. (Synthetic.) W. L. Semon, Silver Lake Village, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,188,420. **Vulcanizing Agent—Quaternary Ammonium** Salt of an Aliphatic Monocarboxylic Acid, Used with an Organic Accelerator. W. L. Semon, Silver Lake Village, O.
2,188,736. **Latex Compound** with a pH Value between 10 and 11. H. F. Jordan, Nutley, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,188,867. **Synthetic Rubber Printing Ink.** A. B. Pöschel, Chicago, Ill., assignor to Meyercord Co., a corporation of Ill.
2,188,980. **Water-Soluble Accelerator.** L. Meuser, Naugatuck, Conn., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,189,017. **Chlorinated Rubber Composition Resist** for Printing Cellulose Acetate Fabrics. G. Rivat, Lyon, France, assignor to H. Dreyfus, London, England.
2,189,411. **Antioxidant**—Diarylamine Containing at Least One Alkenyl Group Linked by Sulphur or Oxygen. R. V. Yohe, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,189,417. **Antioxidant**—Metallic Salt of an Aminophenol. D. Craig, Silver Lake Village, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,189,717. **Accelerator**—2-Mercapto Quinoline. W. Scott, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,189,720. **Accelerator**—A Thiuronium 2-Arylene-Thiazyl Sulphide. G. W. Watt, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,189,721. **Dibenzyl Hexahydro Phthalate.** C. F. Winans, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,189,722. **Esters of Hexahydro Phthalic Acid.** C. F. Winans, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,189,725. **Antioxidant**—Reaction Product of a Primary Amine and Mixed Phenolic Bodies from Coal Tar Oil. A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.
2,189,736. **Antioxidant**—Reaction Product of Turpentine, a Primary Aromatic Amine, and a Salt of Said Amine. W. M. Lauter, Kalamazoo, Mich., assignor to Wingfoot Corp., Wilmington, Del.
2,190,021. **Chewing Gum Base** Containing a Lastic and a Resin. G. A. Hatherell, Roscoe, assignor to F. A. Garbutt, Los Angeles, both in Calif.
2,190,180. **Chewing Gum Coloring Material.** J. O. Barker, assignor to Sweets Laboratories, Inc., both of New York, N. Y.
2,190,287. **Preservation of Rubber Hydrochloride.** A. Hershberger, Buffalo, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
2,190,587. **Plasticizer**—Mercapto Arylene Thiazoles. I. Williams, Woodstown, and C. Smith, Carney's Point, both in N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Dominion of Canada

386,493. **Antioxidant**—Aryloxy Substituted Diaryl Amine. Monsanto Chemical Co., St. Louis, Mo., assignee of J. R. Ingram, Nitro, W. Va., both in the U. S. A.
386,495. **Adhesive**—Comprising Latex, Glycerin, and Casein. National Adhesive Corp., assignee of A. D. Fuller, both of New York, N. Y., U. S. A.
386,702. **Flux Coating** for Welding Rod Containing a Thermoplastic Resin (Polyvinyl Halides, Polystyrene, Halogenated Rubber, Etc.). Dominion Oxygen Co., Ltd., Toronto, Ont., assignee of A. R. Lytle and T. H. Vaughn, co-inventors, both of Niagara Falls, N. Y.

Germany

684,936. **Oil and Benzene-Resistant Mix from Synthetic Rubber.** I. G. Farbenindustrie A.G., Frankfurt a.M.
685,194. **Free Vulcanization.** E. Sachs, London, England. Represented by F. Zumstein, Berlin.
685,311. **Porous Soft Rubber Masses.** Metallgesellschaft A.G., Frankfurt a.M.
685,662. **Stabilizing Solutions of Chlorinated Rubber** in Organic Solvents by Treating with Basic Agents. I. G. Farbenindustrie A.G., Frankfurt a.M.

GENERAL

United States

2,187,789. **Fluid Pressure Brake System.** G. J. Lanz, Wilkinsburg, Pa.
2,187,848. **Stiffened Collar.** W. M. Billing, Kennett Square, Pa., assignor to Hercules Powder Co., Wilmington, Del.
2,187,894. **Eraser Holder.** J. W. Saffold, Cleveland, O.
2,187,983. **Stirrup Pad.** F. J. Moore, Minneapolis, Minn.
2,188,006. **Hose Coupling.** M. Katcher, New York, N. Y.
2,188,025. **Corrosive Resistant Chain.** C. R. Weiss, Indianapolis, Ind., assignor to Link-Belt Co., a corporation of Ill.
2,188,028. **Hair Curler.** R. L. and M. E. Andrea, both of Roslindale, Mass.
2,188,112. **Tire Pressure Alarm.** H. Hicks, Yankton, assignor of one-half to F. L. Vilas and 10% to G. Clabaugh, both of Pierre, both in S. D.
2,188,168. **Shoe Lined with Elastic Fabric.** M. Winkel, New York, N. Y.
2,188,174. **Tire with Artificial Silk Cords.** M. Castricum, Grosse Pointe, and F. C. Kennedy, Detroit, both of Mich., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,188,182. **Arch Supporting Shoe.** H. P. Gould, Boston, Mass.
2,188,183. **Elastic Woolen Fabric.** R. Grosser, West Englewood, N. J., assignor of 33⅓% to W. L. Morris, New York, N. Y.
2,188,190. **Vaginal Injection Appliance.** G. Moos, Zürich, Switzerland.
2,188,211. **Tire Demounting Tool.** J. J. Tilson, Rittman, O.
2,188,221. **Extending Flange for Tractor Wheels.** V. M. Gilkerson, Oakley, Kan.
2,188,236. **Tire Demounting Tool.** J. L. Speer, Ponca City, Okla.
2,188,241. **Stocking.** R. E. Davis, Fort Payne, Ala.
2,188,271. **Dual Rim Mounting.** J. G. Swain, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,188,284. **Golf Ball Cover**—Composition of a Rubber Derivative and a Chloroprene Polymer. (Synthetic.) J. A. Merrill, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,188,285. **Golf Ball Cover**—Composition of Balata and a Chloroprene Polymer. (Synthetic.) J. A. Merrill, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,188,286. **Gasket**—Rubber Hydrochloride. J. A. Merrill, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.
2,188,295. **Elastic Fabric.** J. L. Getaz, Maryville, Tenn.
2,188,302. **Gaskets for Pipe Leaks.** G. H. Pfefferle, assignor, by mesne assignments, to Dresser Mfg. Co., both of Bradford, Pa.
2,188,317. **Non-Carbonizing Arc-Resistant Laminated Material.** E. F. Seaman, Washington, D. C.
2,188,331. **Paper Liner.** G. W. Coggleshall, Yarmouth, Me., assignor to S. D. Warren Co., Boston, Mass.
2,188,422. **Device for Plugging Holes.** H. E. Waner, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,188,427. **Automotive Antenna.** R. M. Daugherty, Cincinnati, O., and W. H. Meyers, Detroit, Mich., assignors to Crosley Corp., Cincinnati, O.
2,188,429. **Wetting Doll.** F. Fenton, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
2,188,440. **Overshoe.** L. H. L'Hollier, Waltham, Mass., assignor to B. F. Goodrich Co., New York, N. Y.
2,188,552. **Fastener for Bumper Mat.** J. H. King and R. R. Wotring, both of Indianapolis, Ind.
2,188,603. **Overshoe.** L. Hamalainen, Virginia, Minn.
2,188,623. **Lamp.** J. W. Dachler, Los Angeles, Calif.
2,188,632. **Diaphragm for Railway Cars.** E. J. W. Ragsdale, Norristown, assignor to E. G. Budd Mfg. Co., Philadelphia, both in Pa.
2,188,640. **Elastic Lace Fabric.** R. Bloch, Pelham Manor, and J. H. Worrall, New York, assignors to Liberty Lace & Netting Works, New York, both in N. Y.
2,188,713. **Valve Core, Container, and Stem.** H. Z. Gora, assignor to Jenkins Bros., both of Bridgeport, Conn.
2,188,718. **Knee Protector.** G. H. Jung, Cincinnati, O.
2,188,771. **Electrode.** W. H. Welch, Chicago, Ill., assignor, by mesne assignments, to Firestone Tire & Rubber Co., Akron, O.

* The Patent Office of London, England has announced that the present emergency has necessitated suspending the preparation of abridgement of patent specifications; consequently their listing here will be discontinued until further notice.

2,188,807. **Motor Mounting.** J. A. Castricone, assignor to Altorfer Bros. Co., both of Peoria, Ill.
2,188,815. **Convex Gasket.** R. C. Murphy, assignor to Corduroy Rubber Co., both of Grand Rapids, Mich.
2,188,844. **Bedpan Cushion.** T. E. Pedersen, New York, N. Y.
2,188,854, 2,188,855, 2,188,857, and 2,188,858. **Oil Seals.** W. J. Chievitz, assignor to Timken Roller Bearing Co., both of Canton, O.
2,188,862. **Locomotive Valve Gear Bearing.** O. J. Horger, assignor to Timken Roller Bearing Co., both of Canton, O.
2,188,866. **Decalcomania.** A. B. Poschel, Chicago, Ill., assignor to Meyercord Co., a corporation of Ill.
2,188,952. **Vehicle Torsion Spring.** J. W. Leighton, Port Huron, Mich.
2,188,981. **Label.** C. J. Moskowitz, Wallington, and R. Emptage, Palisades Park, both in N. J., assignors, by mesne assignments, to United States Rubber Co., New York, N. Y.
2,189,048. **Door Stop.** J. A. Underhill, New York, N. Y.
2,189,085. **Toy Parachute.** J. Schmalz, Chicago, Ill.
2,189,090. **Signaling Cable.** F. Unterbusch, assignor to Felten & Guilleaume Carlswerk A.G., both of Cologne-Mulheim, Germany.
2,189,091. **Cable.** F. Unterbusch, assignor to Felten & Guilleaume Carlswerk A.G., both of Cologne-Mulheim, Germany.
2,189,116. **Massage Device.** H. E. Niemiec, Miami, Fla.
2,189,137. **Connector Strip.** F. R. Eichner, assignor to Yellow Truck & Coach Mfg. Co., both of Pontiac, Mich.
2,189,138. **Rubber Strip Mounting.** F. R. Eichner, assignor to Yellow Truck & Coach Mfg. Co., both of Pontiac, Mich.
2,189,158. **Storage Battery Overfill Preventer.** C. W. Yelm, assignor to Gates Rubber Co., both of Denver, Colo.
2,189,175. **Dental Massaging and Cleaning Device.** C. J. F. Jackson, Winnipeg, Canada.
2,189,180. **Bookmarker.** R. C. Rathsam, Chicago, Ill.
2,189,182. **Tire Cover.** C. W. Ryerson, Jackson, Mich., assignor to Ryerson & Haynes, Inc., a corporation of Mich.
2,189,349. **Mud Pump Piston.** E. E. Miller, Fullerton, Calif.
2,189,388. **Rubber Window Frames for Planes.** S. J. Zand, Forest Hills, assignor to Sperry Gyroscope Co., Inc., Brooklyn, both in N. Y.
2,189,395. **Insulated Conductor** with Inner Rubber Layer Impregnated with Paraffin. A. N. Gray, Baltimore, Md., assignor to Western Electric Co., Inc., New York, N. Y.
2,189,407. **Spare Wheel and Tire Cover Assembly.** F. R. Rueppel, assignor to Clayton & Lambert Mfg. Co., both of Detroit, Mich.
2,189,428. **Pitcher's Rubber.** E. H. Love, Memphis, Tenn.
2,189,472. **Buffer.** E. G. Peterson, Rockford, Ill.
2,189,485. **Tube Valve Stem.** J. C. Crowley, assignor to Dill Mfg. Co., both of Cleveland, O.
2,189,489. **Anti-Slipping Shoe.** J. J. Fritz, Bradford, Pa.
2,189,598. **Shaft Coupling.** W. A. Brecht, assignor to Westinghouse Electric & Mfg. Co., both of Pittsburgh, Pa.
2,189,649. **Typewriter Eraser Attachment.** G. H. Hutaff, Jr., Wilmington, N. C.
2,189,683. **Tire Tool.** F. E. Schultz, Decatur, Ill.
2,189,685. **Oil Seal for Shaft.** R. Stevenson, West Barrington, R. I., assignor to Sealol Co., a corporation of R. I.
2,189,692. **Inner Tube.** W. Van Buren and N. Jones, both of Detroit, Mich.
2,189,764. **Fuse.** W. O. Schultz, assignor to Line Material Co., both of South Milwaukee, Wis.
2,189,813. **Composite Pneumatic Material.** C. V. McGuire, Grosse Pointe, Mich., assignor to Airfilm Corp., a corporation of Mich.
2,189,853. **Suction Cup Support for Rattles.** A. Zadek, New York, N. Y.
2,189,870. **Resilient Suspension Device.** N. Sluyter, Bloemendaal, Netherlands.
2,189,987. **Resilient Electrical Plug.** E. E. Kellems, Eugene, Oreg.
2,190,016. **Bunion Corrector.** J. C. Day and W. F. Marshall, both of Lexington, Ky.
2,190,023 and 2,190,024. **Dry-Sealing Envelopes and Containers.** V. E. Heywood, Worcester, assignor to United States Envelope Co., Springfield, both in Mass.
2,190,030. **Foundation Garment.** W. Kops, assignor to Kops Bros., Inc., both of New York, N. Y.
2,190,117. **Tire Inflation Signal.** E. W. Griffith, Dalhart, Tex.
2,190,142. **Tire Anti-Skid Device.** H. R. Ansel, Cleveland, O.
2,190,196. **Electric Molding Strip.** W. Semenyna, Boston, Mass.
2,190,206. **Rotary Brush with Rubber Hub.** G. R. Churchill, Quincy, Mass.
2,190,233. **Refrigerator Door.** H. D. Geyer, Dayton, O., assignor to General Motors Corp., Detroit, Mich.
2,190,335. **Clothes Wringer.** R. D. O'Callaghan, Des Moines, Iowa.
2,190,342. **Electric Switch.** H. A. Smith, assignor to Knapp-Monarch Co., both of St. Louis, Mo.
2,190,363. **Electrical Fitting for Cord Sets.** R. Knapp, Long Island City, N. Y., assignor to Knapp-Monarch Co., St. Louis, Mo.
2,190,371. **Shaft Mounting for Rolls.** C. L. Taylor, assignor to Aetna Standard Engineering Co., both of Youngstown, O.
2,190,376. **Powder Puff.** F. M. Daley, Shelton, assignor to Sponge Rubber Products Co., Derby, both in Conn.
2,190,378. **Bandage.** (Latex.) J. A. Hinkamp and H. R. Brasel, assignors to General Bandages, Inc., Chicago, Ill.
2,190,383. **Therapeutic Applicator.** L. B. Newman, Chicago, Ill.
2,190,384. **Therapeutic Bag.** L. B. Newman, Chicago, Ill.
2,190,427. **Cleaning Implement.** A. A. Johnson, Holly, Mich.
2,190,440. **Electric Etching or Deposition Frame.** W. Beebe, Cheboygan, Mich., assignor, by mesne assignments, to Trumbull Metal Products Co., a corporation of Del.
2,190,443. **Sealing Means** for Rotary Shaft Openings. C. B. Dalzell, Little Falls, and R. K. Miner, Oriskany Falls, both in N. Y., assignors to Cherry-Burrell Corp., Chicago, Ill.
2,190,463. **Pressure Applying Clamp.** J. A. Watt, Chicago, Ill.
2,190,466. **Telephone Handset.** A. F. Bennett, Millburn, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.
2,190,467. **Telephone Handset.** F. Hamburger, Orange, N. J., now by judicial change of name, F. Hardwick, assignor to Bell Telephone Laboratories, Inc., New York, N. Y.
2,190,476. **Resilient Seal** for Floating Roofs. C. H. Haupt, Elizabeth, and E. W. Hall, Westfield, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.
2,190,530. **Tire Gage.** W. S. Clarkson, Ann Arbor, Mich.
2,190,550. **Suction-Cup Hook.** V. E. Simmons, Johnstown, Pa.
2,190,560. **Stocking.** E. F. Gaines, deceased, by J. S. Gaines, administratrix, both of Bala, Pa.
2,190,579. **Sandal Cover.** L. M. Wash, Louisville, Ky.
2,190,623. **Washing Machine Stand.** B. A. Benson, assignor to Chicago Electric Mfg. Co., both of Chicago, Ill.

Dominion of Canada

386,024. **Lamp Support.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of K. Wiegand, Hohenneuendorf bei Berlin, and F. Göritz, Berlin, co-inventors, both in Germany.
386,036. **Foundation Garment.** Charis, Ltd., New Toronto, Ont., assignee of Charis Corp., assignee of J. Leonard, both of Allentown, Pa., U. S. A.
386,086. **Liners.** S. D. Warren Co., Boston, Mass., assignee of G. W. Coggeshall, Yarmouth, Me., both in the U. S. A.
386,089. **Wheel Rim Mounting.** Wingfoot Corp., Wilmington, Del., assignee of A. W. Woodward, Kent, O., both in the U. S. A.
386,095. **Hosiery.** (Latex.) Vanity Fair Silk Mills, Reading, assignee of H. B. Snader, Temple, both in Pa., U. S. A.
386,116. **Shampoo Apparatus.** N. M. Howe, Austin, Minn., U. S. A.
386,162. **Pump.** Coventry Climax Engines, Ltd., assignee of B. A. Christie, both of Coventry, Warwickshire, England.
386,167. **Racket String.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of F. D. Chittenden and H. Manchester, co-inventors, both of Providence, R. I., U. S. A.
386,185. **Sock.** Penmans, Ltd., assignee of R. A. Graham, both of Paris, Ont.
386,220. **Fabric.** West Coast Manchester Mills, Inc., assignee of M. Fellegi, both of Los Angeles, Calif., U. S. A.
386,256. **Model Airplane.** W. E. Back, Oulton Broad, Suffolk, England.
386,278. **Garment.** C. P. Mele, Natick, Mass., U. S. A.
386,282. **Garment Supporter.** L. Sametz, Westport, Conn., U. S. A.
386,296. **Closure Cap.** Anchor Cap & Closure Corp., Long Island City, assignee of J. C. Gibbs, Brooklyn, both in N. Y., U. S. A.
386,299. **Coated Abrasive.** Behr-Manning Corp., assignee of N. E. Oglesby, both of Troy, N. Y., U. S. A.
386,301. **Corset.** Berger Bros. Co., assignee of I. R. Versoy, both of New Haven, Conn., U. S. A.
386,336. **Resilient Mounting.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. M. Sloman and R. A. Merrill, co-inventors, both of Detroit, Mich., U. S. A.
386,337. **Wire Fastener, Cutter and Shaper.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. J. Tuttle, Waterbury, Conn., U. S. A.
386,372. **Bracket.** United-Carr Fastener Corp., Cambridge, Mass., assignee of W. C. MacFadden, Philadelphia, Pa., both in the U. S. A.
386,401. **Fastener Element Machine.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of Shoe Hardware Co., Waterbury, Conn., U. S. A., assignee of E. Hopkinson, deceased, in his lifetime of New York, N. Y., and F. A. Belanger, F. A. Alcott, and E. F. Hewitt, all of Waterbury, co-inventors with E. Hopkinson.
386,417. **Footwear Traction Device.** M. Glenn, Longmire, Wash., U. S. A.
386,419. **Automobile Wheel Traction Device.** B. Grummett, Saskatoon, Sask.
386,421. **Centrifugal Pump.** F. O. Jaeckel, Johannesburg, South Africa.
386,425. **Foundation Garment.** H. M. Herbener, Thomasville, Ga., U. S. A.
386,434. **Tractor Wheel Non-Skid Apparatus.** E. W. White, Nine-Mile, Victoria, Australia.
386,447. **Caster.** Bassick Co., assignee of W. F. Herold, both of Bridgeport, Conn., U. S. A.
386,448. **Caster or Slide.** Bassick Co., assignee of W. F. Herold, both of Bridgeport, Conn., U. S. A.
386,464. **Cloth Shrinking Machine.** Cluett, Peabody & Co., Inc., assignee of S. L. Cluett, both of Troy, N. Y., U. S. A.
386,504. **Boat Fender.** Rubatex Products, Inc., assignee of D. Roberts, both of New York, N. Y., L. Cooper, Milford, Conn., and R. C. Bascom, Merrick, N. Y., both in the U. S. A.
386,521. **Insole.** E. Mariotti, assignee of A. Winkler, both of Zürich, Switzerland.
386,552. **Water Shoe** with Pneumatic Float. T. McGrath, Chandler, P. Q.
386,558. **Milking Apparatus Valve.** O. A. Simon, Butte, Mont., U. S. A.
386,592. **Reenforced Vinyl Resin Denture.** (Synthetic.) Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of V. Yngve, Lakewood, O., U. S. A.
386,600. **Cord Stretcher and Winder.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of L. M. Cotchett, Hingham, Mass., U. S. A.
386,617. **Package Assembling Apparatus.** President and directors of The Manhattan Co., (sometimes called Bank of The Manhattan Co.), trustee, New York, N. Y., assignee of R. R. Brogden, Orlando, Fla., both in the U. S. A.
386,650. **Tire Anti-Skid Device.** H. S. Fritts, inventor, and H. S. Bowers, assignee of one-half of the interest, both of Washington, N. J., U. S. A.
386,662. **Anesthetic Administering Apparatus.** E. E. W. Anderson, Lindingö, Sweden.
386,665. **Electric Plug.** N. Chirelstein, Chicago, Ill., U. S. A.
386,669. **Tire** with Tread Projecting Rings. I. B. Kaiser, Lyons, N. Y., U. S. A.
386,675. **Scalp Treating Apparatus.** C. Nessler, Palisades, N. Y., U. S. A.
386,676. **Tire Anti-Skid Device.** M. E. Paschke, Williamsville, N. Y., U. S. A.
386,710. **Foundation Garment.** H. W. Gossard Co., assignee of H. Wipperman, both of Chicago, Ill., U. S. A.
386,726. **Radio Condenser Mounting.** Magnavox Co., Inc., assignee of Magnavox Co., both of Fort Wayne, Ind., assignee of R. U. Clark, Wilmette, Ill., both in the U. S. A.
386,773. **Cable.** General Cable Corp., New York, assignee of I. T. Faucett, Westerleigh, both in N. Y., U. S. A.

Germany

684,042. **Footwear.** Romika K. G. Lemm & Co., Gusterath-Tal, Kr. Trier.
684,631. **Rubber Cord to Connect Toy Parts.** Rheinische Gummi-und Celluloid-Fabrik, Mannheim-Neckarau.
684,834. **Belt.** Conrad Scholtz A.G., Hamburg.
684,836. **Packing.** E. Schnabel, Berlin-Lichterfelde.
685,103. **Pessary.** K. W. Schmidt, Nurnberg.
685,201. **Waterproof Garment.** E. Rinneberg, Altdorf b. Nurnberg.
685,957. **Overalls.** Semperit Oesterreichisch-Amerikanische Gummiwerke A.G., Vienna.
685,983. **Dowel.** W. W. Hamill, Chigwell, Essex, England. Represented by M. Morin, Berlin.
685,990. **Pneumatic-tired Wheel for Tractor.** G. Pohl, Berlin-Wilmersdorf.
686,162. **Coupling.** Metallgummi G.m.b.H., Hamburg-Harburg.
686,555. **Belt.** R. Chavand, Lyon, France. Represented by W. Meissner and H. Tischer, both of Berlin.
686,656. **Stopper.** F. Schreiber, Blankenfelde, Kr. Teltow.

TRADE MARKS

United States

374,571. Representation of an oval containing the letters: **"O I C,"** and below, the word: **"Hermetik."** Tire valves. Ohio Injector Co., Wadsworth, O.

(Continued on page 78)

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES OF THE NEW YORK MARKET

Futures	Dec. 30	Jan. 27	Feb. 3	Feb. 10	Feb. 17	Feb 24
Jan. ...	18.95	18.48	.....	.....	.....	.....
Feb. ...	.....	.....	18.61	19.07	19.04	18.16
Mar. ...	18.94	18.57	18.69	19.17	19.09	18.21
July ...	18.50	18.00	18.01	18.45	18.25	17.78
Sept. ...	18.43	17.85	17.83	18.22	18.02	17.65
Dec. ...	.....	17.66	17.62	18.00	17.85	17.50
Jan. ...	.....	.....	17.55	17.95	17.80	17.45
Volume per week (tons)...	5,640	6,410	6,580	7,070	5,230	7,630

THE rubber market ruled firm and quiet during February. May futures closed at 18.23¢ per pound on February 1, advanced to close at 18.75¢ on February 9, and then weakened to close at 18.55¢ on February 19. The following day, when the International Rubber Regulation Committee continued the 80% export quota to July 1, the price dropped sharply to 18.33¢. Thereafter the market was weaker; the closing price on February 28 was 18.05¢ per pound. Trading during the month was light. The market here did not follow the sharp upturn in the London market during mid-month.

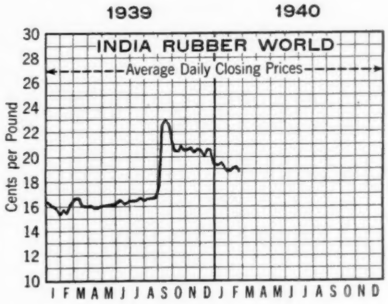
World crude rubber shipments during 1939 exceeded the million-ton mark for the third time in history, amounting to 1,001,394 tons, as compared with 894,940 tons in 1938 and 1,139,800 tons in 1937.

Crude rubber consumption in the United States during January reached the second largest monthly total on record, 54,978 tons, against 48,428 tons in December and the all-time record of 55,764 tons in October, 1939. Consumption during February continued at about the January rate.

During the 80% quota period approximately 111,000 tons of rubber will be available monthly, including shipments from non-agreement territories. Should world absorption continue at 95,000 tons monthly, the approximate rate of last fall, about 96,000 tons will be added to supplies at consuming points during the first half of 1940 which can be readily absorbed in this country alone without weakening the structure of the rubber market.

Gross U. S. imports of crude rubber during January reached a new all-time high of 72,496 long tons with net imports at 71,519 tons, as compared with 68,041 tons in December. Reexports for January were 977 tons, against 1,093 tons for December.

Shipment of barter rubber from Great Britain has been extended three months, until September, 1940.



New York Outside Market—Spot Ribbed Smoked Sheets

New York Outside Market

The outside market here was quiet during February, with little factory or shipment business reported. No. 1 ribbed smoked sheets closed at 18⅞¢ per pound on February 1, rose to 19¼¢ on February 9, and then weakened, closing at 18⅞¢ on February 21. The closing price on February 29 was 18 9/16¢ per pound, with the market easier.

The weed-end closing prices on No. 1 ribbed smoked sheets follow: February 3, 19⅞¢; February 10, 19¼¢; February 17, 19⅛¢; and February 24, 18⅜¢.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	INQUIRY
2731	Manufacturers of mechanical rubber goods for hospital use.
2732	Suppliers of powdered stearic acid.
2733	Suppliers of natural whiting.
2734	Suppliers of cyclohexanol solvents.
2735	Manufacturers of glass dipping forms.
2736	Manufacturer of balls four to five feet in diameter for equestrian push-ball.
2737	Manufacturer of small, pliable, and weather-resistant rubber tubing.

New York Quotations

New York outside market rubber quotations in cents per pound

	Feb. 24, 1939	Jan. 26, 1940	Feb. 27, 1940
Plantations			
Rubber latex..*gal.*	60/61	73/75	71/72
Paras			
Upriver fine......	13½	19¼	16¾
Upriver fine......	*16½	*23¼	*18¾
Upriver coarse ...	10	11¼	11½
Upriver coarse ...	*14	*19	*16
Islands fine......	14	18¾	16
Islands fine......	*15¾	*23	*18¾
Acre, Bolivian fine	13¾	19½	17
Acre, Bolivian fine	*16½	*23½	*19¾
Beni, Bolivian fine	14¾	20	17¾
Madeira fine	14½	19¼	16¾
Caucho			
Upper ball	10	11¼	11½
Upper ball	*14	*19	*16
Lower ball	9¾	11	11¼
Pontianak			
Pressed block	9/14	12¾/17½	12/20
Guayule			
Ampar	13¾	15	15
Africans			
Rio Nuñez	14	19	19
Black Kassai	14	19	19
Prime Niger flake	25	22	22
Gutta Percha			
Gutta Siak	9½	17	17
Gutta Soh	14	24	24
Red Macassar ...	90/1.20	1.20	1.20
Balata			
Block Ciudad Bolivar	27	35	40
Manaos block ...	27	40	40
Surinam sheets ..	40	45	47
Amber	42	50	49

*Washed and dried crepe. Shipments from Brazil.

New Incorporations

Grant Rubber Mfg. Co., 2713 So. Dearborn St., Chicago, Ill. Capital 250 shares common stock, no par value. G. S. Roe, J. Toren, G. I. Menkin. Manufacture all kinds of rubber products.

Latex Specialties, Inc., 692 Stokes Ave., Trenton, N. J. Capital 2,500 shares, no par value. C. H. Geyer and W. Trethaway, both of 692 Stokes Ave., and R. Vance, 1 West State St., all of Trenton. Manufacture all kinds of latex and rubber goods.

National Rubber Roller Co., 109 No. Dearborn St., Chicago, Ill. Capital 100 shares common stock, par value $50 a share. S. and A. Cosmos and E. S. Sternberg. Manufacture, sale, and distribution of rubber rollers.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	Jan., 1940 29	30	31	February, 1940 1	2	3	5	6	7	8	9	10	12*	13	14	15	16	17	19	20	21	22*	23	24
No. 1 Ribbed Smoked Sheet.	18⅝	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	19⅛	19¼	19¼	..	19¼	19 3/16	19 1/16	19⅛	19⅛	19 1/16	18⅞	18⅞	..	18¾	18⅜
No. 1 Thin Latex Crepe....	19⅜	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅜	19⅜	19¾	20	20	..	20	19¾	19⅝	19⅝	19⅝	19 9/16	19⅜	19⅜	..	19¼	18⅞
No. 2 Thick Latex Crepe...	19⅛	19⅜	19⅜	19⅜	19⅜	19⅜	19⅜	19¼	19¼	19½	19¾	19¾	..	19¾	19½	19⅜	19⅜	19⅜	19 5/16	19⅛	19⅛	..	19	18⅝
No. 1 Brown Crepe........	18½	18¾	18¾	18¾	18¾	18¾	18¾	18½	18½	18⅝	18⅞	18⅞	..	18⅞	18⅝	18½	18⅝	18⅝	18 9/16	18⅜	18⅜	..	18¼	17⅞
No. 2 Brown Crepe........	18¼	18½	18½	18½	18½	18½	18½	18¼	18¼	18⅜	18⅝	18⅝	..	18⅝	18½	18⅜	18½	18½	18 7/16	18¼	18¼	..	18⅛	17¾
No. 2 Amber..............	18½	18¾	18¾	18¾	18¾	18¾	18¾	18½	18½	18⅝	18⅞	18⅞	..	18⅞	18⅝	18½	18⅝	18⅝	18 9/16	18⅜	18⅜	..	18¼	17⅞
No. 3 Amber..............	18¼	18½	18½	18½	18½	18½	18½	18¼	18¼	18⅝	18⅝	18⅝	..	18⅝	18½	18⅜	18½	18½	18 7/16	18¼	18¼	..	18⅛	17¾
Rolled Brown.............	16⅛	16⅜	16⅜	16⅜	16⅜	16⅜	16⅜	16¼	16¼	16¼	16½	16½	..	16½	16¼	16⅛	16¼	16¼	16 3/16	16	16	..	15⅞	15½

*Holiday.

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks—Long Tons

Twelve Months	U. S. Imports*	U. S. Con. sumption¶	U. S. Stocks Mfrs. Dealers, Importers, Etc.†	Stocks U. S. Afloat†	U. K.—Public Warehouses, London Liverpool†‡	Singapore and Penang Dealers and Port Stocks†‡	World Production (Net Exports)‡	World Consumption Estimated‡	World Stocks†‡§
1937	584,851	543,600	262,204	63,099	57,785	44,792	1,139,800	1,104,891	646,252
1938	400,178	437,031	231,500	45,105	86,853	27,084	894,940	942,074	596,498
1939	499,473	577,591	140,280	91,095	......	......	......	......	......
1939									
Jan.	39,082	46,234	223,879	48,210	80,643	30,975	87,868	89,021	585,441
Feb.	36,490	42,365	217,534	55,814	75,517	28,559	77,656	83,857	568,780
Mar.	38,989	50,165	205,936	55,981	72,235	23,255	76,974	95,020	545,459
Apr.	29,601	44,166	190,896	57,918	68,931	22,434	73,820	86,859	518,651
May	47,535	44,377	193,602	54,046	66,020	20,849	70,813	89,264	511,847
June	35,947	47,259	181,794	51,274	63,878	19,563	64,419	90,845	500,837
July	36,739	43,880	174,240	52,990	57,234	27,042	84,500	87,533	497,126*a*
Aug.	38,045	50,481	161,362	66,717	44,917	20,543	92,374	96,574	477,666*a*
Sept.	41,939	50,150	150,171	68,310	......	23,457	87,536	84,899	......
Oct.	41,250	55,764	133,183	100,500	......	25,376	115,115	95,339	......
Nov.	42,706	54,322	118,535	114,044	......	23,006	85,611	97,742	......
Dec.	71,395	48,428	140,280*b*	91,095*b*	......	15,346	88,451	89,169	......
1940									
Jan.	72,496	54,978	156,830*b*	90,285*b*	......	.....	.....	.....	.....

*Including liquid latex. †Stocks on hand the last of the month or year. ‡Statistical Bulletin of the International Rubber Regulation Committee. §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, regulated areas, and afloat. ¶Corrected to 100% from estimate of reported coverage.
a Not including stocks at French dealers. *b.* Includes government barter rubber.

THE R. M. A. estimates rubber manufacturers in the U. S. A. consumed 54,978 long tons of crude rubber during January, a 13.5% increase over December, 1939, and an 18.9% increase over January, 1939, when 46,234 long tons were consumed.

Gross imports for January, as reported by the U. S. Department of Commerce, were 72,496 long tons, a 1.5% increase over December imports of 71,395 long tons (revised) and an 85.5% increase over the 39,082 long tons that were imported in January, 1939.

The R. M. A. estimates total domestic stocks on January 31 at 156,830 long tons, an increase of 11.8% over the 140,280 long tons on hand December 31, 1939, but 29.9% lower than the stocks that were reported on hand January 31, 1939.

Crude rubber afloat to U. S. ports on January 31, 1940, is estimated at 90,285 long tons, against 91,095 long tons that were afloat the end of December.

Figures for stocks and rubber afloat for January (above) include U. S. Government emergency rubber. Government stocks at the end of January totaled 1,580 long tons; while rubber afloat to the government amounted to 1,050 long tons.

RECLAIMED RUBBER

ACCORDING to R. M. A. figures, January reclaimed rubber consumption is estimated at 17,596 long tons, 13% above that of December; production, 20,447 long tons; and stocks on hand January 31, 25,530 long tons. Demand during February was off somewhat, with a resumption of higher activity expected in March. The demand from tire manufacturers declined; while demand from other consuming outlets held up well.

The market continues steady, with all grades of reclaim unchanged at last month's level.

New York Quotations

February 23, 1940

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6 / 6¾
Acid	1.18-1.22	7 / 7¼
Shoe		
Standard	1.56-1.60	6½/ 6¾
Tubes		
Red Tube	1.15-1.30	9 / 9¾
Compound	1.10-1.20	9 /10
Miscellaneous		
Mechanical Blends ...	1.25-1.50	4½/ 5
White	1.35-1.50	12½/14

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption % of Crude	U. S. Stocks*	Exports
1937	185,033	162,000	29.8	28,800	13,233
1938	122,403	120,800	27.6	23,000	7,403
1939	198,815	184,942	32.0	25,427	12,610
1939					
Jan.	14,826	13,743	29.7	23,334	748
Feb.	14,102	13,347	31.5	23,461	630
Mar.	15,647	16,197	32.3	22,155	756
Apr.	14,527	13,391	30.3	22,628	748
May	14,769	13,517	30.5	22,771	1,008
June	15,871	14,870	31.5	23,058	759
July	12,588	13,542	30.9	21,339	1,036
Aug	17,595	16,846	33.4	21,024	843
Sept	17,990	16,953	33.8	21,185	1,265
Oct.	20,896	18,955	34.0	21,829	1,816
Nov.	20,755	18,006	33.1	22,362	1,321
Dec.	19,249	15,575	32.2	25,427	1,680
1940					
Jan.	20,447	17,596	32.0	25,530	...

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage.
Compiled by The Rubber Manufacturers Association, Inc.

Shipments of Crude Rubber from Producing Countries—Long Tons

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Thailand	French Indo-China	Total	Philippines and Oceania	Liberia†	Other Africa	South America	Mexican Guayule	Grand Total
1937.......	469,900	431,700	70,400	9,800	7,200	13,200	25,900	35,600	43,400	1,107,100	1,600*	2,300	9,100	16,300	3,400	1,139,800
1938.......	372,046	298,101	49,528	8,455	6,737	9,512	17,792	41,618	59,156	862,945	1,971*	2,929	9,000*	15,337	2,758	894,940
1939.......	376,755	372,430	61,026	9,265	6,616	11.864	24,014	41,266	65,140	968,376	2,049*	6,102	9,600*	16,094	2,916	1,005,137
1939																
Jan.	24,393	39,049	7,237	764	1,115	1,604	2,342	2,918	4,739	84,161	220	528	800	1,812	347	87,868
Feb.	29,278	25,006	5,495	947	618	664	1,484	5,606	5,659	74,757	158	435	800	1,187	319	77,656
Mar.	29,298	27,934	3,718	773	619	344	1,177	5,401	4,636	73,900	230	427	800	1,407	210	76,974
Apr.	29,779	28,341	2,225	881	379	1,687	2,446	2,660	2,581	70,979	135	533	800	1,206	167	73,820
May	29,598	24,429	2,805	1,002	668	558	1,649	2,782	4,585	68,076	129	500*	800	1,077	231	70,813
June	22,052	27,511	3,708	630	805	332	1,157	1,748	4,030	61,973	137	667	800	676	166	64,419
July	26,013	35,681	5,019	782	503	1,603	3,092	5,599	3,367	81,659	190	516	800	1,071	264	84,500
Aug.	40,973	27,478	5,620	203	213	975	1,749	5,230	7,020	89,461	200*	222	800	1,313	378	92,374
Sept.	26,908	37,717	6,064	691	89	429	1,932	4,670	5,943	84,443	200*	599	800	1,356	138†	87,536
Oct.	49,458	45,005	5,234	665	150	1,730	2,487	2,047	5,022	111,798	150*	561	800	1,524	282†	115,115
Nov.	35,773	30,325	4,405	370	449	1,322	2,023	1,428	6,540	82,635	150*	614	800	1,198	214†	85,611
Dec.	33,232	23,954	9,496	1,557	1,008	616	2,476	1,177	11,018	84,534	150*	500*	800	2,267	200*	88,451

*Estimated. †Guayule rubber imports into U.S.A. provisional until export figures from Mexico are received. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

COMPOUNDING INGREDIENTS

THE demand for compounding ingredients during February was at a generally satisfactory level. Activity, which fell off slightly last month, was expected to be renewed during March. Prospects for the second quarter appear favorable at this time.

Prices in general are steady and unchanged. A tight market was reported for blanc fixe, with stocks at a reputedly low level.

CARBON BLACK. Demand was heavier in February, although shipments to tire makers fell off slightly at mid-month. Export business continued heavy, restricted only by shipping space available. Stocks at the end of January were approximately 126,250,000 pounds, more than 30,000,000 pounds under stocks held on January 31, 1939. The price is firm and unchanged.

FACTICE OR RUBBER SUBSTITUTE. The demand was normal for this period of the year. Prices continue unchanged despite a firmness in vegetable oils.

LITHARGE. This pigment was reduced ¼¢ per pound last month, following a decline in the pig lead market. Demand was light.

LITHOPONE. The market was moderately active, and quotations held firm and unchanged.

RUBBER CHEMICALS. The demand for accelerators and antioxidants during February was somewhat less than that of January. Prospects for March business appear excellent. Prices are generally unchanged.

RUBBER SOLVENTS. Consumption by Akron tire makers continued heavy. The price is firm at 9½¢ per gallon.

TITANIUM PIGMENTS. Demand was reported exceptionally good for this time of the year. Some uncertainty exists regarding the quantity of titanium pigments to be used in rubber footwear for the balance of 1940. The January drop in price of titanium calcium pigment has strengthened its demand in rubber compounding and has checked somewhat the tendency to use titanium dioxide with calcium carbonate instead of the compounded pigment. Prices are firm and unchanged.

ZINC OXIDE. With both rubber and paint manufacturers active in the market, volume was at a satisfactory level last month. Prices are steady.

Current Quotations*

Abrasives

Pumicestone, powdered	*lb.*	$0.03	/ $.035
Rottenstone, domestic	*lb.*	.03	/ .035
Silica, 15	*ton*		

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	*ton*	20.00	
Litharge (commercial)	*lb.*	.075	

Accelerators, Organic

A-1	*lb.*	.24	/ .30
A-10	*lb.*	.31	/ .35
A-11	*lb.*	.52	/ .65
A-19	*lb.*	.52	/ .65
A-32	*lb.*	.70	/ .80
A-77	*lb.*	.42	/ .55
A-100	*lb.*	.42	/ .55
Accelerator 49	*lb.*	.40	/ .42
737	*lb.*	.42	/ .43
737-50	*lb.*	.25	/ .26
808	*lb.*	.70	/ .72
833	*lb.*	1.15	
Acrin	*lb.*	.60	
Aldehyde ammonia	*lb.*	.65	/ .70
Altax	*lb.*	.55	/ .60
B-J-F	*lb.*	.50	/ .55
Beutene	*lb.*	.70	/ .75
Butyl Eight	*lb.*	.98	/ 1.00
Zimate	*lb.*	2.50	
C-P-B	*lb.*	2.00	
Captax	*lb.*	.50	/ .55
Crylene	*lb.*	.40	/ .47
Paste	*lb.*	.30	/ .36
D-B-A	*lb.*	2.00	
Delac A	*lb.*	.40	/ .50
O	*lb.*	.40	/ .50
P	*lb.*	.40	/ .50
Di-Esterex-N	*lb.*	.60	/ .70
DOTG (Di-ortho-tolyguanidine)	*lb.*	.44	/ .46
DPG (Diphenylguanidine)	*lb.*	.35	/ .45
El-Sixty	*lb.*	.50	/ .65
Ethylideneaniline	*lb.*	.42	/ .43
Ethyl Zimate	*lb.*	2.50	
Formaldehyde P.A.C.	*lb.*	.0625	
Formaldehydeaniline	*lb.*	.31	
Formaldehyde-para-toluidine	*lb.*	.52	/ .54
Guantal	*lb.*	.40	/ .50
Hepteen	*lb.*	.35	/ .40
Base	*lb.*	1.35	/ 1.50
Hexamethylenetetramine U.S.P.	*lb.*	.39	
Technical	*lb.*	.33	
Lead oleate, No. 999	*lb.*	.135	
Witco	*lb.*	.15	
Ledate	*lb.*	$2.35	
Monex	*lb.*	2.35	
Novex	*lb.*		
O. N. V.	*lb.*	1.00	/$1.10
O-X-A-F	*lb.*	.50	/ .55
Ovac	*lb.*	.50	/ .55
Para-nitroso-dimethylaniline	*lb.*	.85	
Pentex	*lb.*	1.00	/ 1.10
Flour	*lb.*	.15	/ .16
Pip-Pip	*lb.*	2.50	
Pipsolene	*lb.*	1.55	/ 1.85
R-2	*lb.*	1.40	/ 1.80
R-23	*lb.*	.40	
R & H 50-D	*lb.*	.42	/ .43
Rotax	*lb.*	.60	/ .65
Safex	*lb.*	1.20	/ 1.30
Santocure	*lb.*	.80	/ 1.00
Selenac	*lb.*	2.75	
Super-sulphur No. 1	*lb.*	.50	
2	*lb.*	.18	/ .20
Tetrone A	*lb.*	2.70	
Thiocarbanilide	*lb.*	.24	/ .30
Thionex	*lb.*	2.35	
Thiurad	*lb.*	2.35	
Trimene	*lb.*	.55	/ .65
Base	*lb.*	1.05	/ 1.20
Triphenylguanidine (TPG)	*lb.*	.45	
Tuads	*lb.*	2.35	
Ureka	*lb.*	.60	/ .75
Blend B	*lb.*	.60	/ .75
C	*lb.*	.56	/ .65
Vulcanex	*lb.*	.42	/ .43
Vulcanol	*lb.*	.85	
Z-B-X	*lb.*	2.50	
Zenite	*lb.*	.46	/ .48
A	*lb.*	.53	/ .55
B	*lb.*	.46	/ .48
Zimate	*lb.*	2.35	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Prices not recorded will be supplied upon request.

Activators

Aero Ac 50	*lb.*	.46	/ .56
Barak	*lb.*	.50	

Age Resisters

AgeRite Alba	*lb.*	1.50	/ 1.65
Exel	*lb.*	1.00	/ 1.02
Gel	*lb.*	.57	/ .59
Hipar	*lb.*	.65	/ .67
Powder	*lb.*	.52	/ .54
AgeRite Resin	*lb.*	.52	/ .54
D	*lb.*	.52	/ .54
White	*lb.*	1.25	/ 1.40
Akroflex C	*lb.*	.56	/ .58
Albasan	*lb.*	.70	/ .75
Aminox	*lb.*	.52	/ .61
Antox	*lb.*	.56	
B-L-E	*lb.*	.52	/ .61
Powder	*lb.*	.65	/ .74
B-X-A	*lb.*	.52	/ .61
Copper Inhibitor X-872-A	*lb.*	1.15	
Flectol B	*lb.*	.52	/ .65
H	*lb.*	.52	/ .65
White	*lb.*	.90	/ 1.15
M-U-F	*lb.*	1.50	
Neozone (standard)	*lb.*	$0.63	
A	*lb.*	.52	/$0.54
B	*lb.*	.63	
C	*lb.*	.52	/ .54
D	*lb.*	.52	/ .54
E	*lb.*	.63	
Oxynone	*lb.*	.64	/ .80
Parazone	*lb.*	.68	
Permalux	*lb.*	1.20	
Santoflex B	*lb.*	.52	/ .65
Solux	*lb.*	1.30	
Thermoflex A	*lb.*	.65	/ .67
Tysonite	*lb.*	.16	
V-G-B	*lb.*	.52	/ .61

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 *lbs.*	2.70	/ 3.55
liquid, 50%	100 *lbs.*	1.95	
solid (700-*lb. drums*)	100 *lbs.*	2.30	/ 3.15

Antiscorch Materials

A-F-B	*lb.*	.35	/ .40
Antiscorch T	*lb.*	.90	
E-S-E-N	*lb.*	.35	/ .40
R-17 Resin (*drums*)	*lb.*	.10	
RM	*lb.*	1.25	
Retarder W	*lb.*	.36	
U.T.B.	*lb.*	.35	/ .40

Antisun Materials

Heliozone	*lb.*	.21	
Sunproof	*lb.*	.20	/ .25

Colors

Black			
Du Pont powder	*lb.*	.42	/ .44
Lampblack (commercial), *l.c.l.*	*lb.*	.15	
Blue			
Brilliant	*lb.*		
Du Pont dispersed	*lb.*	.83	/ 3.95
Powders	*lb.*	2.25	/ 3.75
Toners	*lb.*	.08	/ 3.85
Brown			
Mapico	*lb.*	.11	
Green			
Brilliant	*lb.*		
Chrome, light	*lb.*		
medium	*lb.*	.22	
oxide (*freight allowed*)	*lb.*		
Dark	*lb.*		
Du Pont dispersed	*lb.*	.98	/ 1.75
Powders	*lb.*	1.00	/ 5.50
Guignet's (*bbls.*)	*lb.*	.70	
Light	*lb.*		
Toners	*lb.*	.85	/ 3.75
Orange			
Du Pont dispersed	*lb.*	.88	/ .98
Powders	*lb.*	.88	/ 2.75
Lake	*lb.*		
Toners	*lb.*	.40	/ 1.60
Orchid			
Toners	*lb.*	1.50	/ 2.00
Pink			
Toners	*lb.*	1.50	/ 2.00
Purple			
Permanent	*lb.*		
Toners	*lb.*	.60	/ 2.10
Red			
Antimony			
Crimson, 15/17%	*lb.*		
R. M. P. No. 3	*lb.*	.48	
Sulphur free R.M.P.	*lb.*	.52	
Golden 15/17%	*lb.*		
7-A	*lb.*	.37	
Z-2	*lb.*	.23	
Cadmium, light (400-*lb. bbls.*)	*lb.*	.75	/ .80
Chinese	*lb.*		
Crimson	*lb.*		
Du Pont dispersed	*lb.*	.93	/ 2.05
Powders	*lb.*	.285	/ 1.05
Mapico	*lb.*	.0925	
Medium	*lb.*		
Rub-Er-Red (*bbls.*)	*lb.*	.0925	
Scarlet	*lb.*		
Toners	*lb.*	.08	/ 2.00
White			
Lithopone (*bags*)	*lb.*	.0360/	.0385
Albalith	*lb.*	.0375/	.04
Astrolith	*lb.*	.0360/	.0385
Azolith	*lb.*	.0375/	.04
Cryptone-BA-19	*lb.*	.05 /	.0525
BT	*lb.*	.05 /	.0525
CB	*lb.*	.05 /	.0525
ZS No. 20	*lb.*	.075 /	.0775
86	*lb.*	.075 /	.0775
230	*lb.*	.075 /	.0775
Sunolith	*lb.*	.0360/	.0385
Ray-Bar	*lb.*	.0525/	.0575
Ray-Cal	*lb.*	.05 /	.0525
Rayox	*lb.*	.13	
Titanolith (5-*ton lots*)	*lb.*	.05 /	.0525
Titanox-A (50-*lb. bags*)	*lb.*	.13 /	1375
B (50-*lb. bags*)	*lb.*	.0525/	.0550
30 (50-*lb. bags*)	*lb.*	.0525/	.0550
C (50-*lb. bags*)	*lb.*	.05 /	.0525
M (50-*lb. bags*)	*lb.*	.0525/	.0550

Ti-Tone	lb.	
Zinc Oxide		
Azo ZZZ-11	lb.	$0.0625/$0.0650
44	lb.	.0625/ .0650
55	lb.	.0625/ .0650
66	lb.	.0625/ .0650
French Process, Florence		
Green Seal-8	lb.	.08 / .0825
Red Seal-9	lb.	.075 / .0775
White Seal-7	lb.	.085 / .0875
Kadox, Black Label-15	lb.	.065 / .0675
No. 25	lb.	.075 / .0775
Red Label-17	lb.	.065 / .0675
Horse Head Special 3	lb.	.0625/ .065
XX Red-4	lb.	.0625/ .065
23	lb.	.0625/ .065
72	lb.	.0625/ .065
78	lb.	.0625/ .065
80	lb.	.0625/ .065
103	lb.	.0625/ .065
110	lb.	.0625/ .065
St. Joe (lead free)		
Black Label	lb.	.0625/ .065
Green Label	lb.	.0625/ .065
Red Label	lb.	.0625/ .065
U.S.P.	lb.	.095 / .0975
White Jack	lb.	.075 / .0775
Zopaque (*bags*)	lb.	.13 / .1375

Yellow

Cadmolith (cadmium yellow), (400-*lb. bbls.*)	lb.	.50 / .55
Du Pont dispersed	lb.	1.25 / 1.75
Powders	lb.	.135 / 2.75
Lemon	lb.	
Mapico	lb.	.0675
Toners	lb.	2.50

Dispersing Agents

Darvan	lb.	.30 / .39
Nevoll (*drums, carlot*)	lb.	.0245
Santomerse S	lb.	.11 / .25

Fillers, Inert

Asbestine, *c.l.*	ton	15.00
Barytes	ton	30.00 /36.00
f.o.b., St. Louis (50-*lb. paper bags*)	ton	22.85
off color, domestic	ton	20.00 /25.00
white, imported	ton	29.00 /32.00
Blanc fixe, dry, precip.	lb.	.03 / .035
Calcene	ton	37.50 /43.00
Infusorial earth	lb.	.02 / .03
Kalite No. 1	ton	24.00 /30.00
3	ton	34.00 /40.00
Magnesia, calcined, heavy	lb.	.04
Carbonate, *l.c.l.*	lb.	.07 / .095
Paradene No. 2 (*drums*)	lb.	.045
Pyrax A	ton	6.00 /20.00
Whiting		
Columbia Filler	ton	9.00 /14.00
Guilders	100 lbs.	
Paris white, English cliffstone	100 lbs.	
Southwark Brand (commercial)	100 lbs.	
All other grades	100 lbs.	
Suprex, white extra light	ton	45.00
heavy	ton	45.00
Witco, *c.l.*	ton	6.00

Finishes

Rubber lacquer, clear	gal	
colored	gal.	
Starch, corn, pwd.	100 lbs.	
potato	lb.	
Talc	ton	25.00 /45.00

Flock

Cotton flock, dark	lb.	.10 / .12
dyed	lb.	.40 / .80
white	lb.	.11 / .19
Rayon flock, colored	lb.	1.00 / 1.50
white	lb.	.75 / 1.00

Latex Compounding Ingredients

Accelerator 85	lb.	.35
89	lb.	1.40
122	lb.	1.55
552	lb.	2.50
Aerosol OT Aqueous 10%	lb.	.15 / .175
Antox, dispersed	lb.	.42
Aquarex A	lb.	.35
D	lb.	.75
F	lb.	.85
WA Paste	lb.	.28
Areskap No. 50	lb.	.18 / .24
100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	.35 / .50
400, dry	lb.	.51 / .65
Black No. 25, dispersed	lb.	.22 / .40
Catalpo	ton	
Collocarb	lb.	.07
Color Pastes, dispersed	lb.	.35 / 1.90
Compound G-11 NW	lb.	
Dispersex No. 15	lb.	.11 / .12
No. 20	lb.	.08 / .10
Emo, brown	lb.	.15
white	lb.	.15
Factice Compound, dispersed	lb.	.40
Heliozone, dispersed	lb.	.25
Igepon A	lb.	
MICRONEX, Colloidal	lb.	$0.055 /$0.07
Nekal BX (dry)	lb.	
Palmol		.13
Pipsol X	lb.	3.05 / 3.55
R-2 Crystals	lb.	2.50 / 2.75
R-23	lb.	.40
RN-2	lb.	2.00 / 2.25
Crystals	lb.	2.00 / 2.25
S-1 (400-*lb. drums*)	lb.	.65
Santobrite Briquettes	lb.	.17 / .26
Powder	lb.	.16 / .26
Santomerse D	lb.	.41 / .65
S	lb.	.11 / .25
No. 1	lb.	.18 / .35
No. 2	lb.	.18 / .35
No. 3	lb.	.40 / .65
No. 3P	lb.	.29 / .45
Santovar A	lb.	1.15 / 1.40
Stablex A	lb.	.90 / 1.10
B	lb.	.65 / .90
C	lb.	.40 / .50
Sulphur, dispersed	lb.	.10 / .15
No. 2	lb.	.075
T-1 (400-*lb. drums*)	lb.	.40
Tepidone	lb.	1.20
Vulcan Colors	lb.	
Zinc oxide, dispersed	lb.	.12 / .15

Mineral Rubber

Black Diamond	ton	25.00
Hydrocarbon, hard	ton	21.00 /42.00
Parmr	ton	21.00 /25.00
Pioneer	ton	
285°-300°	ton	21.00 /42.00

Mold Lubricants

Mold Paste	lb.	.12 / .18
Sericite	ton	65.00 /75.00
Soapbark	lb.	
Soapstone, *l.c.l.*	ton	25.00 /35.00

Oil Resistant

AXF	lb.	.40 / .50

Reenforcers

Carbon Black

Aerfloted Arrow Specification (*bags only*)	lb.	.02425†
Arrow Compact Granulized	lb.	.02425†
Certified Heavy Compressed (*bags only*)	lb.	.02425†
Spheron	lb.	.02425†
Continental, dustless	lb.	.02425†
Compressed (*bags only*)	lb.	.02425†
Disperso	lb.	.02425†
Dixie	lb.	.02425†
Dixiedensed	lb.	.02425†
66	lb	.02425†
Excello, dustless	lb.	.02425†
Heavy compressed (*bags only*)	lb.	.02425†
Fumonex	lb.	.03
Gastex	lb.	.03 / .07
Kosmobile	lb.	.02425†
66	lb.	.02425†
Kosmos	lb.	.02425†
MICRONEX Beads	lb.	.02425†
Mark II	lb.	.02425†
Standard	lb.	.02425†
W-5	lb.	.02425†
P-33	lb.	.0475 / .0725
Pelletex	lb.	.03 / .07
Supreme, dustless	lb.	.02425†
Heavy compressed (*bags only*)	lb.	.02425†
Thermax	lb.	.02 / .0475
Velvetex	lb.	.022 / .035
"WYEX BLACK"	lb.	.02425†

Clays

Aerfloted Paragon (50-*lb. bags*)	ton	10.00
Suprex (50-*lb. bags*)	ton	10.00
Barden	ton	10.00
Chicora	ton	10.00
China	ton	17.50 /20.00
Crown	ton	10.00
Dixie	ton	10.00 /22.50
Hi-White	ton	10.00
Langford	ton	8.50
NcNamee	ton	10.00 /22.50
Par	ton	10.00
Witco, *c.l.*	ton	10.00

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Compound G-4	lb.	
G-11	lb.	
Curodex 19	lb.	2.75
188	lb.	3.50
198	lb.	4.50
Para-Dors	lb.	
Rodo No. 0	lb.	3.50 / 4.00
10	lb.	4.50 / 5.00

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is 2.30¢ per pound; f.o.b. Hoboken (bulk), 3.18¢; f.o.b. No. Atlantic Docks (bags), 3.30¢. All prices are carlot.

Rubber Substitutes

Black	lb.	$0.08 /$0.12
Brown	lb.	.08 / .115
White	lb.	.085 / .135
Factice		
Amberex	lb.	.305
Brown	lb.	.08 / .12
Fac-Cel B	lb.	.13
C	lb.	.13
Neophax A	lb.	.095
B	lb.	.095
White	lb.	.09 / .135

Softeners

Bondogen	lb.	.98 / 1.25
Burgundy pitch	lb.	.06
Cycline oil	gal.	.14 / .20
Nuba resinous pitch (*drums*)		
Grades No. 1 and No. 2	lb.	.0265
Nubalene Resin	lb.	.025
Palm oil (Witco), *c.l.*	lb.	
Pine tar	gal.	
Plastogen	lb.	.0775/ .10
R-19 Resin (*drums*)	lb.	.10
21 Resin (*drums*)	lb.	.10
Reogen	lb.	.115 / .22
Rosin oil, compounded	gal.	.40
RPA No. 1	lb.	.65
2	lb.	.65
3	lb.	.46
Rubtack	lb.	.10
Tackol	lb.	.085 / .18
Tonox	lb.	.52 / .61
Tonox D	lb.	.75 / .85
Witco No. 20, *l.c.l.*	gal.	.20
X-1 resinous oil (*tank car*)	lb.	.01
X-159 rubber reclaiming oil	gal.	.20

Solvents

Beta-Trichlorethane	gal.	
Carbon bisulphide	lb.	
tetrachloride	lb.	
Cosol No. 1	gal.	.27 / .32
No. 2	gal.	.27 / .32
No. 3	gal.	.27 / .32
Industrial 90% benzol (*tank car*)	gal.	.16
Skellysolve	gal.	

Stabilizers for Cure

Laurex (*bags*)	lb.	.1125/ .1375
Stearex B	lb.	
Beads	lb.	
Stearic acid, single pressed	lb.	.10 / .11
Stearite, *c.l.*	100 lbs.	10.50
Zinc stearate	lb.	.24 / .26

Synthetic Rubber

Neoprene Type E	lb.	.65
G	lb.	.70
GW	lb.	.75
H	lb	.78
M	lb.	.65
Latex Type 57	lb.	.30

Varnish

Shoe	gal.	1.45

Vulcanizing Ingredients

Sulphur		
Chloride (*drums*)	lb.	.035 / .04
Rubber	100 lbs.	2.00
Telloy	lb.	1.75
Vandex	lb.	1.75
(See also Colors—Antimony)		

Waxes

Carnauba, No. 3 chalky	lb.	
2 N.C.	lb.	
3 N.C.	lb.	
1 Yellow	lb.	
2	lb.	
Montan, crude	lb.	

United States Latex Imports

Year	Pounds (d.r.c.)	Value
1937	51,934,040	$10,213,670
1938	26,606,048	4,147,318
1939	61,460,003	10,467,552
1939		
Jan.	3,589,452	599,927
Feb.	3,844,996	657,565
Mar.	4,491,951	731,302
Apr.	2,279,171	360,739
May	6,240,019	1,067,682
June	4,111,994	694,863
July	6,572,567	1,064,927
Aug.	5,855,400	1,001,013
Sept.	5,656,700	965,615
Oct.	5,724,048	968,207
Nov.	6,878,398	1,227,788
Dec.	6,215,307	1,127,924

Data from Leather and Rubber Division, Washington, D. C.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Dec. 30	Jan. 27	Feb. 3	Feb. 10	Feb. 17	Feb. 24
Jan. ...	11.27	.....	.....	.....	.....	.....
Feb. ...	.....	.....	10.91	11.16	.....	.....
Mar. ...	11.15	10.95	10.97	11.16	11.17	11.30
July ...	10.54	10.29	10.23	10.55	10.53	10.63
Sept. ...	10.14	9.88	9.84	10.09	10.08	10.19
Dec. ...	9.67	9.38	9.40	9.64	9.04	9.76
Jan. ...	.....	.....	9.35	9.59	9.62	9.73

COTTON prices strengthened somewhat last month. The New York 15/16-inch spot middling price, which closed at 10.99¢ per pound on January 31, advanced steadily to close at the higher level of 11.38¢ per pound on February 21. The closing price on February 28 was 11.43¢ per pound, with the market steady.

The Census Bureau reported January consumption of all cotton, exclusive of linters, in domestic mills at 730,143 bales, against 652,695 in December and 598,132 in January, 1939. The January figure was the largest of any month on record except for March, 1937, when consumption totaled 777,000 bales. Exports in January were 1,026,628 bales, against 806,120 in December and 289,514 in January, 1939.

The Department of Agriculture announced on January 30 that the cotton export subsidy plan, instituted in July, 1939, was ended since funds earmarked for this purpose were almost depleted. However subsidy rates on cotton products, other than card strips and comber waste, will be continued. Cotton and cotton products, handled under the plan, as of January 29, were equivalent to 6,214,000 bales.

Fabrics

The demand for fabrics during February was somewhat under that of January. With a depressed market, mills were not disposed to contract ahead. Unless March runs counter to past experience, demand should be improved considerably during that month. The most active part of the raincoat trade is in men's coats.

The market is easier, and all fabrics are lower in price than a month ago, with the exception of tire fabrics and hollands, which are unchanged.

New York Quotations

February 23, 1940

Drills	
38-inch 2.00-yard .... yd.	$0.12½
40-inch 3.47-yard	.07½
50-inch 1.52-yard	.17⅝
52-inch 1.85-yard	.14½
52-inch 1.90-yard	.13⅝
52-inch 2.20-yard	.12¼
52-inch 2.50-yard	.11
59-inch 1.85-yard	.14
Ducks	
38-inch 2.00-yard D. F. .... yd.	.12½/.13½
40-inch 1.45-yard S. F.	.17⅜
51½-inch 1.35-yard D. F.	.20
72-inch 1.05-yard D. F.	.26⅝/.27⅝
72-inch 17.21-ounce	.29⅜
Mechanicals	
Hose and belting .... lb.	.27¾
Tennis	
52-inch 1.35-yard .... yd.	.20⅛
Hollands	
Gold Seal and Eagle	
20-inch No. 72 .... yd.	.10
30-inch No. 72	.18
40-inch No. 72	.20
Red Seal and Cardinal	
20-inch .... yd.	.08½
30-inch	.15¾
40-inch	.17
50-inch	.26
Osnaburgs	
40-inch 2.34-yard .... yd.	.10⅝
40-inch 2.48-yard	.10
40-inch 2.56-yard	.09⅛
40-inch 3.00-yard	.08¾
40-inch 7-ounce part waste	.08⅞
40-inch 10-ounce part waste	.12½
37-inch 2.42-yard	.10¾
Raincoat Fabrics	
Cotton	
Bombazine 60 x 64 .... yd.	.07¾
Plaids 60 x 48	.10¾
Surface prints 60 x 64	.11¾
Print cloth, 38½-inch, 60 x 64.	.05¼
Sheetings, 40-inch	
48 x 48, 2.50-yard .... yd.	.08¾
64 x 68, 3.15-yard	.08¼
56 x 60, 3.60-yard	.07
44 x 40, 4.25-yard	.05⅜
Sheetings, 36-inch	
48 x 48, 5.00-yard .... yd.	.04¾
44 x 40, 6.15-yard	.03¾
Tire Fabrics	
Builder	
17¼ ounce 60" 23/11 ply Karded peeler .... lb.	.31
Chafer	
14 ounce 60" 20/8 ply Karded peeler .... lb.	.30½
9¼ ounce 60" 10/2 ply Karded peeler .... lb.	.30
Cord Fabrics	
23/5/3 Karded peeler, 1-1/16" cotton .... lb.	.31½
15/3/3 Karded peeler, 1-1/16" cotton .... lb.	.29½
12/4/2 Karded peeler, 1-1/16" cotton .... lb.	.28½
23/5/3 Karded peeler, 1¼" cotton .... lb.	.37
23/5/3 Combed Egyptian .... lb.	.50½
Lene Breaker	
8¼ ounce and 10¼ ounce 60" Karded peeler .... lb.	.33

Trade Lists Available

The Commercial Intelligence Division recently compiled the following trade lists, of which mimeographed copies may be obtained by American firms from the U. S. Bureau of Foreign and Domestic Commerce or its district or cooperative offices by referring to the titles. The price is 10¢ a list for each country.

Automotive products, manufacturers, Peru, Uruguay.
Boots and shoes, manufacturers, Mexico, Paraguay, Peru.
Dental supply houses, Paraguay.
Electrical supplies and equipment, importers and dealers, Argentina.
Office supplies and equipment, importers and dealers, Canada, Dominican Republic, Guatemala.
Rubber goods, manufacturers, Mexico.
Sporting goods, importers and dealers, Dominican Republic.
Tire rebuilders and retreaders, Portugal.

INDO-CHINA

(*Continued from page 63*)

francs are available for the purpose. He invites the submission of plans for the organization.

Here too the question of packing rubber is one again requiring special attention as a result of the war. Indo-China packs all its rubber in plywood cases, and it is calculated that if the output reaches 70,000 tons in 1940, 700,000 cases must be imported. Since European suppliers are now unable to make shipments, local producers will have to fall back on cases from Japan; and it is feared that the Japanese will take full advantage of the situation. Apart from this possibility, packing is expensive, and the attempt is therefore being made to encourage planters to export their rubber in bales. It has even been suggested that the adoption of this method should be hastened by requesting the government to prohibit the entry of plywood cases into Indo-China.

The record shipments of 11,256 tons of crude rubber in December, 1939, brought rubber exports from Indo-China for 1939 to the high total of 65,482 long tons. The amount permitted under the International Rubber Regulation Agreement was 60,000 tons.

CEYLON

Ceylon's crude rubber shipments during 1939 total 60,822 tons, against 49,528 in 1938. As the exportable allowance for 1939 was 62,275 tons, Ceylon underexported by 1,453 tons. At the end of 1938 the carry-over was 7,145 tons. Had it not been for the high December exports, Ceylon's shortage at the end of 1939 would have been almost as high again, for to the end of November, 1939, net exports were only 51,412 tons.

Despite much adverse criticism, from official and private circles, the Ceylon State Council sanctioned a vote of 300,000 rupees asked by the Minister of Labor, Industry and Commerce for setting up a rubber factory in Ceylon. It is proposed to begin by retreading automobile tires and producing automobile tubes as well as cycle tires and tubes and other molded goods. Eventually it is intended also to make new automobile tires. In support of the scheme it was pointed out that at present Ceylon imports rubber goods to a value of 2,500,000 rupees.

JAPAN

Japan, which has been cutting imports of various kinds, including rubber, in October, 1939, was an unexpectedly heavy buyer of crude rubber. Of 10,100 metric tons shipped from Java, 5,351 tons went to Japan.

Some years ago a certain amount of rubber was planted on Hainan Island, and small quantities of rubber have been produced there. The Japanese are now reported to be considering the possibility of etablishing large rubber plantations there.

FINANCIAL

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

The Baldwin Locomotive Works, Philadelphia, Pa., and subsidiaries. For 1939: consolidated net profit, $542,026, equal after preferred dividend requirements of $115,505 to 41¢ a common share, against net loss of $1,032,641 in 1938.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Year ended December 31, 1939: net income, $93,-218,664, equal after dividends on debenture and preferred stocks, to $7.70 a share on 11,050,767 common shares, against $50,190,827, or $3.79 each on 11,044,594 common shares in 1938.

Flintkote Co., 50 W. 50th St., New York, N. Y., and subsidiaries. For 1939: net income, $1,432,383, equal to $2.11 each on 677,546 outstanding shares, against $811,818, or $1.21 each, on 672,-996 shares in 1938; net sales, $17,164,-148 against $15,147,709.

General Motors Corp., Detroit, Mich. Year ended December 31, 1939: consolidated earnings, $183,300,000, equal, after preferred dividends, to $4.04 a share on the average number of common shares outstanding during the year, against $102,190,007, or $2.17 a share in 1938.

L. H. Gilmer Co., Tacony, Philadelphia, Pa. For 1939: net profit, $98,275, or $1.18 each on 82,824 shares, against $60,134, or 72.4¢, in 1938; current assets, $396,039; current liabilities, $204,138.

Goodyear Tire & Rubber Co., Akron, O., and subsidiaries. Year ended December 31, 1939: net profit, $9,838,797 after depreciation, interest, subsidiary dividends, federal income taxes, and a deduction of $1,791,602 to reduce value of net current assets in foreign countries to reflect rates of exchange prevailing at the year end, equal, after $5 preferred dividend requirements, to $3.20 a share on 2,059,168 no-par common shares, excluding, 2,288 in the treasury, compared with net profit in 1938 of $6,012,423, or $1.34 a common share, after $1,009,513 foreign exchange adjustment; net sales, $200,101,704 against $165,928,944; current assets, $109,251,502, current liabilities $16,015,-813, against $106,121,405 and $9,142,000, respectively, at the end of 1938. A reduction of $5,000,000 was made in the company's funded debt.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., and combined companies. Year ended December 31, 1939: operating profit, $2,-204,249, equal to $5.25 a share, against $2,757,587, or $7.49 a share, in 1938; current assets, $10,073,099, against $9,-501,340; current liabilities, $1,132,302, against $531,688; after payment of common dividends January 22 current liabilities were $489,152.

Hewitt Rubber Corp., Buffalo, N. Y. For 1939: net earnings, $358,810, equal to $2.13 a share, against $83,352, or 50¢ a share, in 1938. Sales and earnings for 1939 established a new high record for the company, according to Thomas Robins, Jr., president.

Minnesota Mining & Mfg. Co., St. Paul, Minn. For 1939: net profit (new high, $4,364,974, equal to $4.54 each on 96,260 shares of common stock, compared with $3,410,417, or $3.54 a share, in 1938.

Mohawk Rubber Co., Akron, O., and subsidiaries. For 1939: net income $301,782, equal to $2.23 a common share, against $273,231, or $2.06 a share, in 1938; net sales $3,177,997, against $3,-096,459.

National Lead Co., 111 Broadway, New York, N. Y., and wholly owned domestic subsidiaries. Year ended December 31, 1939: net profit, $5,780,500 after depreciation, depletion, federal taxes, provision for inventory reserve and other charges and after deducting non-recurring losses of $1,602,221, equal, after dividends on the Class A and B preferred stock, to $1.23 a share on 3,095,100 shares of $10 par common stock, excluding 3,210 held by the company, contrasted with net profit of $4,-283,140, or 75 cents a common share, in 1938.

New Jersey Zinc Co., 160 Front St., New York, N. Y. Year ended December 31, 1939: net income, $5,299,055 after federal taxes, depreciation, depletion, contingencies, and other deductions, equal to $2.70 each on 1,963,264 shares of capital stock, against $3,220,-314, or $1.64 a share, in 1938.

Parke, Davis & Co., Detroit, Mich., and subsidiaries. For 1939: net profit, $9,254,202, equal after deductions for depreciation, interest, federal and foreign income taxes, and other charges, to $1,89 each on the 4,894,743 shares of no-par capital stock, against $8,639,955, or $1.76 a share, in 1938.

Russell Mfg. Co., Middletown, Conn. Year ended November 30, 1939: net income, $56,767, equal to $1.23 each on 46,240 capital shares, after giving effect to two-for-one stock split approved by stockholders on December 19, 1939, contrasted with a net loss of $219,399 in the preceding fiscal year.

Skelly Oil Co., Tulsa, Okla., and subsidiaries. Year ended December 31, 1939: net profit, $2,360,783, after interest, depreciation, depletion, federal income taxes, and other charges, equal after allowing for 6% preferred dividend requirements, to $1.99 each on 995,349 shares of $15 par common stock, excluding 13,200 shares in the treasury, contrasted with net profit of $2,650,054, or $2.27 a common share, in 1938.

United States Rubber Co., New York, N. Y., and subsidiaries. Year ended December 31, 1939: net income after all current charges including provision for losses on foreign exchange and after deducting net income applicable to minority interest in subsidiaries, $10,218,-849, equal after providing the full dividend of $8 a share on the 8% noncumulative preferred stock to $3.18 a common share based on the average number of shares outstanding in 1939, contrasted with net income of $5,885,-887, or 44¢ each on 1,536,101 shares of common in 1938; consolidated net sales after all returns, discounts, excise and sales taxes, transportation, and allowances, $195,310,847, against $154,935,756 in 1938, and the highest since 1927; current assets, $105,219,990 including $14,-426,772 cash and $60,973,436 inventories, current liabilities, $30,710,116, against current assets, $89,939,698, including $16,574,581 cash and $50,167,226 inventories, and current liabilities, $23,262,486 in the preceding year; net funded indebtedness, $42,144,000, against $43,022,-000. (Although the consolidated balance sheet includes the assets and liabilities of Fisk Rubber Corp., acquired on December 30, 1939, no Fisk income is included in the U. S. Rubber consolidated income statement for 1939.)

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Dewey & Almy Chemical Co.	Pfd.	$1.25 q.	Mar. 15	Mar. 1
Faultless Rubber Co.	Com.	$0.25 q.	Apr. 1	Mar. 15
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	Mar. 1	Feb. 15
General Motors Corp.	Pfd.	$1.25 q.	May 1	Apr. 8
General Tire & Rubber Co.	Com.	$0.50	Feb. 29	Feb. 19
General Tire & Rubber Co.	Pfd.	$1.50	Mar. 30	Mar. 20
Goodyear Tire & Rubber Co.	Com.	$0.25 extra	Mar. 15	Feb. 24
Hewitt Rubber Corp.	Com.	$0.25	Mar. 15	Mar. 1
Lima Cord Sole & Heel Co.	Com.	$0.125	Mar. 30	Mar. 15
Seiberling Rubber Co.	A Pfd.	$1.25	Apr. 1	Mar. 15
Seiberling Rubber Co.	B Pfd.	$75.38*	Apr. 1	Mar. 15
Seiberling Rubber Co.	$2.50 Conv. Prior Pfd.	$0.45	Apr. 1	Mar. 15
United Elastic Corp.	Com.	$0.15	Mar. 23	Mar. 1
Westinghouse Electric & Mfg. Co.	Com.	$0.875	Feb. 29	Feb. 13

*To eliminate arrearages; clears way for resumption of payments on common shares.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

YOUNG MALE SECRETARY-STENOGRAPHER, EXPERIENCED developing sales promotion of mechanical rubber products. Seeks responsible position to executive. Well educated. References. Address Box No. 78, care of INDIA RUBBER WORLD.

FACTORY MANAGER, THOROUGHLY EXPERIenced all phases of manufacture of both soft and hard rubber products, interested in finding suitable position. Hold similar position now. Location immaterial. Willing to go abroad. Address Box No. 79, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

SALES REPRESENTATIVE WANTED BY EASTERN MOLDER OF a wide variety of hard rubber products to work on a strictly commission basis. Address Box No. 77, care of INDIA RUBBER WORLD.

RUBBER CHEMIST WANTED BY LARGE EASTERN COMPANY interested in manufacture of synthetic rubber. Must be graduate chemist or chemical engineer with three to five years' experience in rubber industry both in non-routine laboratory work and factory compounding and processing. Opening offers opportunity in research, manufacture, and sales. Recent snapshot, personal information, and salary requirements requested. Address Box No. 84, care of INDIA RUBBER WORLD.

FOSTER D. SNELL, INC.
Chemists—Engineers
Every form of Chemical Service
805 Washington Street Brooklyn, N. Y.

INTERNATIONAL PULP CO.
41 Park Row, NEW YORK, N. Y.
SOLE PRODUCERS
ASBESTINE
REG. U. S. PAT. OFF.

BUSINESS OPPORTUNITIES

WANTED: SOURCE OF SUPPLY FOR ¼", ⅜", AND ½" CORRUGATED matting in various colors, must not be smaller than 6' by 15' or thereabouts. May be continuous lengths. Aslo ⅛" and 3/16" corrugated matting in rolls. Price must be competitive. Address Box No. 81, care of INDIA RUBBER WORLD.

WANTED FOR RENT OR BUY: SMALL RUBBER PLANT WITH mill- and press-equipment. Address Box No. 82, care of INDIA RUBBER WORLD.

MISCELLANEOUS

METAL BOND CEMENT APPLIED COLD WILL unite vulcanized rubber to metal, wood, or other surfaces with which it is usually difficult to secure a good bond. KENNETH R. ELWELL, La Grange, Ill.

Compounding Ingredients for Rubber
by the Editors of
INDIA RUBBER WORLD
$2.50 Postpaid in U. S. A. $2.75 Elsewhere

MECHANICAL MOLDED RUBBER GOODS
Sponge Rubber: Sheeted—Die Cut—Molded
We Solicit Your Inquiries
THE BARR RUBBER PRODUCTS COMPANY
SANDUSKY, OHIO

"Rubber—Physical and Chemical Properties"

By T. R. DAWSON, M.SC., F.I.C., F.I.R.I., and B. D. PORRITT, M.SC., F.I.C., & C.

A Technical Handbook produced by the cooperation of The Rubber Growers' Association, Inc., and The Research Association of British Rubber Manufacturers.

Cloth, 700 pages, 8½ by 11 inches. **Price $12.50 Postpaid.**

Above book will be sent postpaid on receipt of remittance.

INDIA RUBBER WORLD
420 LEXINGTON AVENUE NEW YORK, N. Y.

AN APPROVED CLAY
CROWN CLAY

SOUTHEASTERN CLAY COMPANY
AIKEN, SOUTH CAROLINA

(*Advertisements continued on page 79*)

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	Commodity	City and Country
*6050	Elastic fabrics	Lokeren, Belgium
†6060	Wires and cables	Athens, Greece
*6068	Automobile accessories	Cali, Colombia
*6079	Office supplies	Singapore, Straits Settlements
‡6080	Batteries	Cairo, Egypt
*6081	Wires and cables	Bombay, India
‡6090	Rubber tapping knives and tools	Singapore, Straits Settlements
*6097	Automobile accessories and combs	Johannesburg, South Africa
‡6116	Office supplies	Rio de Janeiro, Brazil
*6121	Elastic yarn	Athens, Greece
*6122	Rubber shoes, balloons, and bathing caps	Athens, Greece
*6125	Bandages, waterproof garments, imitation leather	Johannesburg, South Africa
*6154	Batteries	Cairo, Egypt
†6160	Plastic materials and machinery for combs and buttons	Guadalajara, Mexico
†6187	Belting	Damascus, Syria
*6197	Balloons	Cairo, Egypt
‡6204	Automobile accessories	Melbourne, Australia
‡6210	Druggists' sundries	Cairo, Egypt
†6211	Automobile accessories	Zürich, Switzerland
‡6218	Druggists' sundries	Bridgetown, Barbados
*6224	Sheet rubber and rubber waste	Brussels, Belgium
*6226	Foundation garments	Guatemala, Guatemala
*6227	Cables	Athens, Greece
*6233	Office supplies	Cairo, Egypt
‡6241	Imitation leather	Alexandria, Egypt
‡6244	Sporting goods	Alexandria, Egypt
‡6249	Heels and soles	Alexandria, Egypt
‡6254	Rubber-soled footwear	Alexandria, Egypt
‡6267	Automobile accessories	Alexandria, Egypt
*6281	Rubber heels and soles	Alexandria, Egypt
*6282	Office and school supplies	Cairo, Egypt
‡6302	Sporting and camping goods	Alexandria, Egypt
†6303	Buttons and combs	Cairo, Egypt
*6304	Buttons and toothbrushes	Alexandria, Egypt
*6331	Office supplies	Cairo, Egypt
*6343	Batteries	Cairo, Egypt
‡6370	Household rubber goods	Brussels, Belgium
*6371	Sporting goods	Quebec, Canada
†6385	Druggists' sundries	Paris, France
†6395	Packings	Rio de Janeiro, Brazil
*6405	Gum arabic	Rio de Janeiro, Brazil
†6406	Battery boxes	Buenos Aires, Argentina
†6411	Rubber rings	Cartagena, Colombia

*Agency. †Purchase. ‡Purchase and agency.

LIBERIA

Recently published figures show that Liberia rubber producers—outside of American interests—sold 319,792 pounds of rubber, value, $42,366, during the year ended October 31, 1939. Most of this was produced on small Liberian-owned plantations not far from Monrovia; while the remaining 33,510 pounds came from the neighborhood of Cape Palmas.

CALENDAR

Mar. 4-8.	American Society for Testing Materials. Committee Week. (Spring Meeting, Mar. 6). Statler Hotel, Detroit.
Mar. 5.	Los Angeles Rubber Group. Mayfair Hotel.
Mar. 15.	New York Rubber Group. Building Trades Employers' Assn., 2 Park Ave.
Mar. 15.	Chicago Rubber Group. Hotel Sherman.
Mar. 18-20.	N. A. W. M. D. 1940 Convention. Hotel Astor, New York.
Apr. 2.	Los Angeles Rubber Group. Mayfair Hotel.
Apr. 5.	Boston Rubber Group. University Club.
Apr. 8-12.	American Chemical Society. Spring Meeting. Cincinnati. Division of Rubber Chemistry. April 11 and 12. Hotel Gibson.
Apr. 9-10.	Midwest Power Conference. Palmer House, Chicago.
May 13-15.	American Institute of Chemical Engineers. Statler Hotel, Buffalo.
June 3-6.	National Assn. of Purchasing Agents. 25th Annual International Convention and Inform-A-Show. Hotel Netherland Plaza. Cincinnati.
June 6-8.	17th National Colloid Symposium, Division of Colloid Chemistry, A. C. S. University of Michigan, Ann Arbor.
Oct. 7-11.	National Safety Council. 29th Annual Safety Congress and Exposition. Stevens Hotel, Chicago.

RUBBER SCRAP

THE scrap market was fairly active during February, with domestic demand holding at a moderate level. Export business was reported to be quiet. The market is steady with all grades of scrap continuing at last month's quotations.

Consumers' Buying Prices

(Carload Lots for February 23, 1940)

		Prices
Boots and Shoes		
Boots and shoes, black	*lb.*	$0.01⅛/$0.01¼
Colored	*lb.*	.01 / .01⅛
Untrimmed arctics	*lb.*	.01 / .01⅛
Inner Tubes		
No. 1, floating	*lb.*	.11 / .12
No. 2, compound	*lb.*	.04⅞/ .05
Red	*lb.*	.04⅝/ .04¾
Mixed tubes	*lb.*	.04¼/ .04⅝
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	*ton*	14.00 /15.00
Beadless	*ton*	17.50 /18.50
Auto tire carcass	*ton*	30.00 /35.00
Black auto peelings	*ton*	26.00 /27.00
Solid		
Clean mixed truck	*ton*	34.00 /35.00
Light gravity	*ton*	42.00 /44.00
Mechanicals		
Mixed black scrap	*ton*	20.00 /22.00
Hose, air brake	*ton*	20.00 /22.50
Garden, rubber covered	*ton*	12.50 /14.00
Steam and water, soft	*ton*	12.50 /14.00
No. 1 red	*lb.*	.03 / .03¼
No. 2 red	*lb.*	.02¼/ .02½
White druggists' sundries	*lb.*	.03¾/ .04
Mixed mechanicals	*lb.*	.02¼/ .02½
White mechanicals	*lb.*	.03⅝/ .03¾
Hard Rubber		
No. 1 hard rubber	*lb.*	.12 / .13

Tire Production Statistics

	Pneumatic Casings		
	Inventory	Production	Shipments
1937	10,383,235	53,309,973	53,485,388
1938	8,451,390	40,906,735	43,132,302
1939	8,688,215	57,077,969	56,975,044
1940			
Jan.	9,388,742	4,976,548	4,276,512

	Pneumatic Casings		
	Original Equipment	Replacement Sales	Export Sales
1937	22,352,601	29,886,326	1,246,461
1938	10,716,130	30,565,008	1,048,934
1939	18,164,441	37,536,608	1,273,995
1940			
Jan.	1,804,606	2,382,826	89,080

	Inner Tubes		
	Inventory	Production	Shipments
1937	10,311,745	52,373,330	52,766,728
1938	8,165,696	37,847,656	40,292,614
1939	7,173,642	51,367,418	51,758,353
1940			
Jan.	7,633,798	4,286,924	3,826,667

Source: The Rubber Manufacturers Association, Inc. Figures adjusted to represent 100% of the industry.

Trade Marks

(*Continued from page 66*)

374,574. **Buckeye.** Batteries. B. F. Goodrich Co., New York, N. Y.
374,612. **Richland.** Tires and tubes. Mansfield Tire & Rubber Co., Mansfield, O.
374,762 **Ace.** Photographers' trays. American Hard Rubber Co., New York, N. Y.
374,763. Representation of a spade with the letter: "A" in center. Photographers' trays and developing materials. American Hard Rubber Co., New York, N. Y.
374,769. Representation of a coach over the letters: **"H. R. H."** Elastic fabric. Jodel, Inc., New York, N. Y.
374,791. **Lithe Line.** Exerciser. Helena Rubinstein, Inc., New York, N. Y.
374,806. **Scot Tournament.** Golf balls. Golf Ball, Inc., Chicago, Ill.
374,813. **Synex.** Wires and cables. Anaconda Wire & Cable Co., New York, N. Y.
375,005. **Milon.** Camelback. General Tire & Rubber Co., Akron, O.
375,053. **Apollo.** Tires. Goldblatt Bros., Inc., Chicago, Ill.
375,087. **Kro-Flite.** Golf balls. A. G. Spalding & Bros., Inc., Chicago, Ill.
375,133. **Marlene.** Sanitary goods. J. J. Newberry Co., New York, N. Y.
375,160. A substantially straight narrow red line extending warpwise of the goods and repeated at suitable intervals. Upholstery fabrics. Sidney Blumenthal & Co., Inc., New York, N. Y.
375,165. **Dec-o Tape.** Tape. Van Cleef Bros., Chicago, Ill.
375,168 Representation of clenched fist in corona of electric flashes. Wires and cables. Kennecott Wire & Cable Co., Phillipsdale, R. I.
375,207. Representation of statue of Venus De Milo. Erasers, rubber bands, and office supplies American Lead Pencil Co., Hoboken, N. J.
375,210. **Liliputian Print.** Diaper bags. Best & Co., Inc., New York, N. Y.
375,218 Representation of two babies, the one pulling and stretching panties of the other. Baby Pants. International Latex Corp., Dover, Del.
375,259 **Faircraft.** Clothing and footwear. The Fair, Chicago, Ill.
375,271. **Ziprain.** Raincoats. Chicago Rubber Clothing Co., Racine, Wis.
375,302. **Husky Tape.** Tape. Seamless Rubber Co., Inc., New Haven, Conn.
375,314 Representation of a sheep's head and a crock, and the words: **"Sceap hirde."** Raincoats and sport wear. D. Siegel Co., New York, N. Y.
375,318. **Noreg.** Druggists' sundries. Nyal Co., Detroit, Mich.
375,374. **Hadley Hall.** Footwear. Rodes-Rapier Co., Inc., Louisville, Ky.
375,452. **Center Poise.** Footwear. Edison Bros. Stores, Inc., St. Louis, Mo.
375,455. **Dryper.** Baby pants and diaper covers. International Latex Corp., Dover, Del.
375,456. **You Foundations.** Foundation garments. Blackton-Fifth Avenue Ltd., New York, N. Y.

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

CONSOLIDATED OFFERS: Watson-Stillman Hydro-Pneumatic Accumulator, 8" ram, 48" stroke, 42" air cylinder, 5,000# PSI, complete with high-pressure air receiver and inter-connecting fittings; 3-W.S. 4-cylinder opposed Hydraulic Pumps, 6,000# PSI, 25 GPM, motor driven, 100 HP AC motors; 7-Gould Triplex Hydraulic Pumps, 3-1,500 PSI, 35 GPM, 4-3,000 PSI, 18 GPM; 6-24" x 24" Hydraulic Presses, 12", 14" rams; 2-30" x 30" Hydraulic Presses, 14" rams; 60" Mixing Rolls; 66" 3-roll Calender. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, N. Y. C.

FOR SALE: CRUDE BALE RUBBER CUTTER, CHEAP. CUTS frozen or soft rubber easily and rapidly. Address Box No. 80, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES WANTED

WANTED FOR USER: 1—NO. 3 OR NO. 9 BANBURY MIXER; 3—Mills; 1—Calender; 5—Hydraulic Presses, with pumps and accumulators; 2—Tubers. Address Box No. 83, care of INDIA RUBBER WORLD.

WANTED: COMPLETE RUBBER LABORATORY, CONSISTING of mill, calender, Banbury, single or double presses, testing machines, shelves, etc. Address Box No. 85, care of INDIA RUBBER WORLD.

Where Needs Are Filled

The Classified Ad. Columns of INDIA RUBBER WORLD bring prompt results at low cost.

British Malaya—Exports in Tons

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Charing Cross, London, S.W.1, England, gives the following figures for August to December, 1939, inclusive.—Rubber Exports: Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham.

	Aug., 1939		Sept., 1939		Oct., 1939		Nov., 1939		Dec., 1939	
To	Sheet and Crepe Rubber	Latex, Concentrated Latex, Revertex, and Other Forms of Latex	Sheet and Crepe Rubber	Latex, Concentrated Latex, Revertex, and Other Forms of Latex	Sheet and Crepe Rubber	Latex, Concentrated Latex, Revertex, and Other Forms of Latex	Sheet and Crepe Rubber	Latex, Concentrated Latex, Revertex, and Other Forms of Latex	Sheet and Crepe Rubber	Latex, Concentrated Latex, Revertex, and Other Forms of Latex
United Kingdom	7,579	544	7,634	554	6,229	694	1,982	648	1,791	673
United States	26,851	1,055	24,975	1,097	45,940	1,197	32,500	786	23,006	1,610
Continent of Europe	9,602	244	3,285	180	5,998	82	4,388	156	3,900	197
British possessions	4,595	87	4,076	61	4,450	54	5,662	94	4,677	151
Japan	2,144	19	2,686	15	4,439	25	1,610	9	4,415	22
Other countries	775	7	529	2	1,711	20	1,438	3	1,120	6
Totals	51,546	1,951	43,185	1,909	68,767	2,072	47,580	1,696	38,909	2,659

World Net Imports of Crude Rubber—Long Tons

Year	U.S.A.	U.K.†	Argentine	Australia	Belgium	Canada	France	Greater Germany‡	Italy	Japan	Poland	Sweden	U.S.S.R.	Rest of World	Total
1937	592,500	135,900	9,500	19,300	15,000	36,100	60,000	115,000	24,000	62,200	6,100	6,700	30,400	52,600	1,120,400
1938	406,330	168,172	7,653	12,309	11,310	25,696	58,148	107,917	28,170	46,307	7,849	8,304	26,811	49,174	928.030
1939															
Jan.	36,614	7,121	417	954	898	2,867	4,694	9,095	2,133	2,553	665	643	4,000*	4,282	70,651
Feb.	30,578	8,087	1,092	1,785	1,068	1,451	5,327	8,348	2,025	3,263	709	467	1,000*	4,824	66,710
Mar.	45,286	12,092	440	1,324	1,242	2,458	4,503	9,028	1,525	4,019	985	581	2,000*	4,901	86,374
Apr.	31,590	7,129	786	1.138	855	1,559	5,650	9,316	1,926	3,579	673	994	2,000*	4,614	69,432
May	45,390	10,488	353	1,202	792	3,069	4,646	9,031	1,573	4,438	940	1,047	1,000*	5,818	86,830
June	33,950	10,287	965	1,348	621	2,465	4,649	8,677	1,992	3,067	693	2,252	500*	4,701	74,196
July	36,932	6,205	983	1,472	836	3,214	4,282	8,849	1,408	3,668	750*	644	1,000*	4,179	72,158
Aug.	38,319	9,391	619	2,182	952	2,187	....	....	....	3,146	....	1,057	2,500*	4,906	76,650
Sept.	36,197	....	965	875	108	2,639	....	....	....	2,801	....	280	....	4,776	....
Oct.	39,735	....	562	1,335	519	5,787	....	....	....	2,749	....	....	....	4,697	....
Nov.	41,358	....	....	....	667	1,709	....	....	....	....	....	....	....	....	....

* Estimated. †U. K. figures show gross imports, not net imports. ‡Including imports of Austria and Czechoslovakia. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

Rims Approved by The Tire & Rim Association, Inc.

Rim Size	12 Mos., 1939 No.	12 Mos., 1939 %	12 Mos., 1938 No.	12 Mos., 1938 %
Drop Center Rims, 16" Diameter and Under				
15x4.00D	25,771	0.2	8,198	0.1
16x4.50D	1,426	0.1	7,893	0.1
12x2.50C	30,120	0.2	......	...
15x5.50E	151	0.0	......	...
15x3.00D	124,266	0.9	57.711	0.7
15x3.50D	......	...	46	0.0
15x4.50E	96,062	0.7	......	...
15x5.00F	166,443	1.2	69,320	0.8
15x5.50F	215,624	1.6	106.474	1.3
16x3.50D	336,352	2.5	290.823	3.5
16x4.00E	7,118,783	52.7	4,878,018	58.1
16x4.25E	867,773	6.4	418,273	5.0
16x4.50E	3,056,041	22.6	1,591,210	19.0
16x5.00F	1,298,234	9.6	772,931	9.2
16x5.50F	17,510	0.1	59.302	0.7
16x6.00F	17,999	0.1	24,178	0.3
Drop Center Rims, 17" Diameter and Over				
17.300D	1,521	0.0	2,895	0.0
17x3.25E	9.38	0.0	6,764	0.1
17x3.62F	8,102	0.1	3,974	0.0
17x4.00F	......	...	266	0.0
17x5.00F	539	0.0	167	0.0
18x2.15B	45,596	0.3	29,046	0.3
18x3.00D	3,636	0.0	3,450	0.0
18x3.25E	4,525	0.0	3,047	0.0
18x3.62F	22,728	0.2	19,090	0.2
18x4.00F	12.526	0.1	3,544	0.0
18x4.19F	6,543	0.0	7,662	0.1
19x2.15B	557	0.0	1,099	0.0
19x2.75D	258	0.0	......	...
19x3.00D	289	0.0	......	...
19x3.25E	4,264	0.0	248	0.0
20x3.25E	3,195	0.0	6,588	0.1
20x3.62F	2,018	0.0	2,662	0.0
21x3.00D	978	0.0	962	0.0
21x3.25E	12,574	0.1	5,679	0.1
22x3.25E	......	...	3,108	0.0
Flat Base Rims for Balloon Tires				
All sizes	6,470	0.0	3,523	0.0
Flat Base Rims for High Pressure Tires				
All sizes	149	0.0	232	0.0
Clincher Rims				
All sizes	891	0.0	1,155	0.0
15" Truck Rims				
15x5	......	...	144	0.0
15x7	4,906	0.1	3,714	0.2
15x8	2,383	0.1	2,300	0.1
15x9/10	......	...	15	0.0
17" Truck Rims				
17x5	53,429	1.6	63,163	3.5
17x6	58,304	1.7	51,860	2.8

Rim Size	12 Mos., 1939 No.	12 Mos., 1939 %	12 Mos., 1938 No.	12 Mos., 1938 %
18" Truck Rims				
18x5	444	0.0	302	0.0
18x6	404	0.0	3,368	0.2
18x7	25,367	0.7	15,078	0.8
18x8	27,495	0.8	16,766	0.9
18x9/10	3,420	0.1	2,516	0.1
19" Truck Rims				
19x11	35	0.0	......	...
20" Truck Rims				
20x5	619,660	18.0	344,778	19.0
20x6	1,388,513	40.3	864,632	47.5
20x7	751,842	21.8	244,453	13.4
20x8	253,953	7.4	91,473	5.0
20x9/10	30,646	0.9	14,392	0.8
20x11	2,664	0.1	3,240	0.2
22" Truck Rims				
22x7	310	0.0	540	0.0
22x8	16,437	0.5	12,582	0.7
22x9/10	8,089	0.2	5,504	0.3
24" Truck Rims				
24x6	12,941	0.4	1,512	0.1
24x7	3,214	0.1	2,399	0.1
24x8	3,043	0.1	3,876	0.2
24x9/10	11,564	0.3	9,059	0.5
24x11	6,430	0.2	4,153	0.2
Tractor and Implement Rims				
24x11	6,430	0.2	4,153	0.2
Semi-Drop Base Rims for Light Trucks				
16x4.50E	54,344	1.6	9,957	0.5
16x5.50F	106,211	3.1	49,470	2.7
Tractor and Implement Rims				
12x2.50C	4,901	1.0	124	0.0
12x3.00D	14,441	2.8	5,031	1.3
13x5.50F	19,024	3.6	3,742	1.0
15x3.00D	41,808	8.2	48,370	12.2
15x4.50E	275	0.1	......	...
15x5.50F	1,593	0.3	......	...
16x3.00D	16,174	3.2	1,147	0.3
16x5.50F	146	0.0	......	...
16x6.00F	3,612	0.7	8,996	2.3
16x8.00F	1,304	0.3	1,159	0.3
18x5.50F	26,319	5.2	10,792	2.7
19x3.00D	27,187	5.3	......	...
19x4.00E	170	0.0	......	...
20x4.50E	6,460	1.3	4,123	1.0
20x5.00F	......	...	2,262	0.6
20x5.50F	4,264	0.8	7,673	1.9
21x3.00D	1,245	0.2	925	0.2
22x4.50E	17,231	3.4	6,464	1.6
24x3.00D	63	0.0	13	0.0

Rim Size	12 Mos., 1939 No.	12 Mos., 1939 %	12 Mos., 1938 No.	12 Mos., 1938 %
Tractor and Implement Rims (*Cont'd*)				
28x4.00E	265	0.1	44	0.0
30x3.00D	108	0.0	......	...
36x3.00D	2,478	0.5	1,484	0.4
36x4.00E	87	0.0	......	...
36x4.50E	3,829	0.7	718	0.2
40x3.00D	219	0.0	61	0.0
40x4.00E	95	0.0	331	0.1
40x4.50E	184	0.0	289	0.1
40x5.50F	......	...	27	0.0
44x4.00E	38	0.0	164	0.0
44x4.50E	205	0.0	......	...
24x5.50R	30,162	5.9	34,115	8.6
32x5.50R	......	...	3,249	0.8
36x5.50R	10,584	2.1	6,572	1.7
40x5.50R	3,978	0.8	6,665	1.7
20x8.00T	2,367	0.5	1,084	0.3
24x6.00S	6,488	1.3	6,215	1.6
24x8.00T	56,731	11.1	64,717	16.3
28x6.00S	1,478	0.3	3,687	0.9
28x8.00T	23,846	4.7	26,008	6.5
32x6.00S	88	0.0	......	...
32x8.00T	8,735	1.7	7,663	1.9
36x6.00S	30,726	6.0	40,332	10.1
36x8.00T	64,337	12.7	67,535	17.0
40x6.00S	14,721	2.9	24,869	6.3
40x8.00T	1,297	0.2	1,121	0.3
42x8.00T	130	0.0	510	0.1
44x8.00T	103	0.0	186	0.0
24x7WB	13,636	2.7	......	...
24x8WB	11,030	2.2	......	...
24x9WB	45	0.0	......	...
28x9WB	3,156	0.6	......	...
28x10WB	9,793	1.9	......	...
32x6WB	4,973	1.0	......	...
36x6WB	3,117	0.6	......	...
36x8WB	831	0.2	......	...
36x10WB	1,528	0.3	......	...
38x7WB	6,053	1.2	......	...
38x8WB	2,254	0.4	......	...
38x9WB	2,526	0.5	......	...
38x10WB	715	0.1	......	...
44x7WB	526	0.1	......	...
Cast Wheels				
10x5.00F	469	26.1	1,281	61.0
10x6.00F	538	29.9	405	19.3
24x10	126	7.0	......	...
24x13	12	0.7	......	...
24x15	660	36.6	421	20.0
Airplane Rims				
All sizes	3.548	0.0	780	0.0
Totals	17,471,914		10,612,138	

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	September, 1939		Nine Months Ended September, 1939	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Crude rubber, etc. . . . . lb.	5,581,794	$916,223	47,848,472	$7,381,329
Latex (dry weight) . . . . . . lb.	328,472	69,171	1,227,499	241,985
Gutta percha . . . . lb.	635	81	9,227	6,047
Rubber, recovered . . . . lb.	1,171,500	64,356	9,472,900	474,137
Rubber, powdered, and gutta percha scrap . . . . lb.	626,700	12,872	4,320,700	66,186
Balata . . . . lb.	672	150	15,089	2,586
Rubber substitute . . . . lb.	12,700	5,320	233,500	53,310
Totals	7,722,473	$1,068,173	63,127,387	$8,225,580
PARTLY MANUFACTURED				
Hard rubber comb blanks . . .	. . . . . .	$1,753	. . . . . .	$9,951
Hard rubber, n. o. s. . . . . . lb.	3,491	3,468	26,228	20,524
Rubber thread not covered. lb.	2,601	1,901	42,782	33,887
Totals	6,092	$7,122	69,010	$64,362
MANUFACTURED				
Bathing shoes . . . . pairs	. . . . . .	. . . . . .	61,777	$13,170
Belting	. . . . . .	$7,922	. . . . . .	87,531
Hose	. . . . . .	8,968	. . . . . .	89,414
Packing	. . . . . .	6,091	. . . . . .	46,373
Boots and shoes . . . . pairs	9,710	9,971	28,355	28,567
Canvas shoes with rubber soles . . . . pairs	150	71	129,754	45,624
Clothing, including waterproofed	. . . . . .	3,639	. . . . . .	32,411
Raincoats . . . . number	314	1,604	17,295	55,333
Gloves . . . . dozen pairs	631	1,913	5,905	15,995
Hot water bottles	. . . . . .	3,447	. . . . . .	7,978
Liquid rubber compound	. . . . . .	8,008	. . . . . .	55,725
Tires, bicycle . . . . number	9,514	3,747	72,884	36,450
Pneumatic . . . . number	2,467	37,974	19,056	250,087
Solid for automobiles and motor trucks . . . . number	24	769	148	7,379
Other solid tires	. . . . . .	1,221	. . . . . .	9,535
Inner tubes . . . . number	1,035	3,054	6,418	16,175
Bicycle . . . . number	1,033	276	27,699	6,306
Mats and matting	. . . . . .	5,490	. . . . . .	38,183
Cement	. . . . . .	9,034	. . . . . .	52,706
Golf balls . . . . dozens	940	1,978	35,229	74,290
Heels . . . . pairs	1,853	172	53,418	3,083
Other rubber manufactures . .	. . . . . .	156,682	. . . . . .	1,149,907
Totals	. . . . . .	$272,031	. . . . . .	$2,122,222
Totals, rubber imports . .	. . . . . .	$1,347,326	. . . . . .	$10,412,164

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada	Reexports of Foreign Goods	Produce of Canada	Reexports of Foreign Goods
UNMANUFACTURED	Value	Value	Value	Value
Waste rubber	$13,344	. . . . . .	$87,231	. . . . . .
MANUFACTURED				
Belting	23,074	. . . . . .	503,759	. . . . . .
Bathing caps	2,845	. . . . .	4,204	. . . . . .
Canvas shoes with rubber soles	36,333	. . . . .	994,510	. . . . . .
Boots and shoes	386,847	. . . . . .	3,391,586	. . . . . .
Clothing, including waterproofed	45,120	. . . . . .	424,772	. . . . . .
Heels	4,390	. . . . .	117,186	. . . . . .
Hose	24,997	. . . . .	265,914	. . . . . .
Soles	3,877	. . . . . .	123,357	. . . . . .
Soling slabs	1,419	. . . . . .	29,765	. . . . . .
Tires, pneumatic	676,119	. . . . .	5,690,802	. . . . . .
Not otherwise provided for	305	. . . . .	711	. . . . . .
Inner tubes	55,602	. . . . . .	503,247	. . . . . .
Other rubber manufactures . .	49,851	$454	566,192	$39,113
Totals	$1,310,779	$454	$12,616,005	$39,113
Totals, rubber exports . .	$1,324,123	$454	$12,703,236	$39,113

Imports by Customs Districts

	December, 1939		December, 1938	
	*Crude Rubber		*Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	17,789,109	$3,114,763	11,898,464	$1,927 965
Buffalo	. . . . . .	. . . . . .	67,200	9,083
New York	117,599,404	19,830,333	57 214,324	9,021,087
Philadelphia	3,346,866	524,807	1,228,283	178,423
Maryland	3,235,464	514,084	1,565,686	225,324
Virginia	. . . . . .	. . . . . .	111,994	15,200
Georgia	. . . . . .	. . . . . .	966,925	119,604
Mobile	112,896	15,288	207,200	31,112
New Orleans	3,505,960	558,111	2,002,773	278,032
El Paso	100,800	9,898	. . . . . .	. . . . . .
Los Angeles	10,419,587	1,743,273	8,376,438	1,270,379
San Francisco	. . . . . .	. . . . . .	304,809	45,552
Oregon	44,800	7,000	. . . . . .	. . . . . .
Ohio	3,714,192	714,950	. . . . . .	. . . . . .
Colorado	56,000	8,292	. . . . . .	. . . . . .
Totals	159,925,078	$27,040,799	83,944,096	$13,121,761

*Crude rubber including latex dry rubber content.

Increasing Use of Tractor Tires

The number of tractors on American farms now totals 1,700,000, according to a survey by the economic research division of the Firestone Tire & Rubber Co., Akron, O. The state leading in the number of farm tractors in use is Illinois, with Iowa second and Texas third. Other states having large numbers of tractors are, in order: Kansas, Minnesota, Ohio, Indiana, Wisconsin, Nebraska, California, New York, Michigan, Pennsylvania, and Missouri.

Today 85% of tractors are turned out on rubber tires. The following table shows the progress made each year since 1932.

Year	Total Tractors Sold	Tractors Sold on Rubber	Changed over to Rubber
1932	13,224	0	0
1933	15,974	900	3,000
1934	49,188	4,600	7,300
1935	118,667	17,800	19,600
1936	158,444	50,700	27,100
1937	216,169	92,400	36,600
1938	143,703	98,000	38,500
1939	190,000	161,500	45,350
Totals	905,369	425,900	177,450

As of the first of this year, 603,350 tractors were on rubber. The total value of tractor and farm implement tires sold from 1933 to date is estimated at $77,000,000; while it is predicted that the market this year, including original equipment, changeovers, and replacements, will total $25,000,000.

U. S. Trade in Rubber Products[1]

Calendar Years 1938 and 1939

Comparing United States trade in rubber products in the last two calendar years, imports were 23.1% greater and exports were 44.8% greater in 1939. Official statistics, with details by groups, follow:

	Calendar Years		%
	1938	1939	Change
U. S. imports of rubber products	$1,039,934	$1,280,207	+23.1
Rubber tires	54,830	131,849	+140.5
Rubber footwear, soles, heels	197,735	157,545	—20.3
Belting, hose, packing, etc.	74,472	107,999	+45.0
Specialties and sundries	333,075	423,129	+27.0
Hard rubber goods	63,398	72,197	+13.9
Reclaimed rubber	94	1,287	+1269.1
Scrap rubber	129,969	228,836	+76.1
Other rubber and gutta-percha goods.	186,361	157,365	—15.6
U. S. exports of rubber products	$27,181,379	$39,367,050	+44.8
Tires, tubes, solids, etc.	13,582,699	19,683,818	+44.9
Rubber footwear, soles, heels	977,338	1,265,838	+29.5
Belting, hose, packing, etc.	4,465,557	7,418,046	+66.1
Rubberized fabrics	948,350	1,126,337	+18.8
Specialties and sundries	2,469,265	2,733,905	+10.7
Hard rubber goods	500,757	525,584	+5.0
Reclaimed rubber	890,018	1,426,277	+60.3
Scrap rubber	1,012,960	1,535,178	+51.6
Rubber thread	335,686	581,056	+73.1
Rubber cements	481,338	748,865	+55.6
Gutta-percha goods	301,040	441,230	+46.6
Other rubber goods	1,216,371	1,880,916	+54.6

[1] From *Rubber Products Trade Notes,* Feb. 20, 1930.

U. S. Consumption of Synthetic Rubber, 1938

According to the Leather and Rubber Division, 1938 consumption of synthetic rubbers (Neoprene, "Thiokol," and Buna) by 168 firms in the United States totaled 1,824,375 pounds. The figures are not complete as reports of consumption by numerous small users were not received. Practically all of the companies reporting were engaged in the production of some form of mechanical rubber goods; one exception was a rubber glove manufacturer.

Number of Firms	Consuming Groups	Consumption Synthetic Rubber (Pounds)
10	Over 50,000 pounds	945,709
13	20,000 — 50,000 pounds	364,016
16	10,000 — 20,000 pounds	232,822
24	5,000 — 10,000 pounds	177,268
38	1,000 — 5,000 pounds	81,557
67	Under 1,000 pounds	23,003
168		1,824,375

Rubber News Letter, Oct. 15, 1939.

New Iodine Antiseptic for First-Aid Use

"Isodine-Davis," a non-alcoholic solution of iodine, claimed superior in many respects to the alcoholic tincture of iodine, is said by the manufacturer to have the same antiseptic properties as the tincture of iodine, to be less painful when applied, not to burn or destroy the tissues, and to penetrate more deeply. It comes in 2cc. and 10cc. applicators and in unit cartons containing 10 swabs, each representing an individual treatment.